Five Creeks Rangeland Restoration Project

Environmental Assessment
OR-06-027-022

Bureau of Land Management
Burns District Office
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FIVE CREEKS RANGELAND RESTORATION PROJECT

ENVIRONMENTAL ASSESSMENT
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CHAPTER I. INTRODUCTION: PURPOSE OF AND NEED FOR ACTION

A. Introduction

The Burns District Bureau of Land Management (BLM) proposes to implement an ecological restoration project to manage encroaching juniper on both public and private lands within the Five Creeks Rangeland Restoration Project Area (Project Area). The area is located in Harney County approximately 50 air miles southeast of Burns, Oregon (Maps A and B, Statewide and Project Vicinity Maps). The Project Area includes portions of the Smyth-Kiger (#5331), Happy Valley (#5309), Riddle Mountain (#5310), Riddle/Coyote (#5329), Burnt Flat (#5604), Stonehouse (#6040), Jenkins Burnt Flat Fenced Federal Range (FFR) (#5327), Clemens FFR (#5323), and Riddle FFR (#5324) grazing allotments (T. 29 S., R. 33 E., T. 28 S., R. 34 E., T. 29 S., R. 34 E., T. 29 S., R. 35 E., T. 30 S., R. 33 E., T. 30 S., R. 34 E., T. 30 S., R. 35 E., T. 30.5 S., R. 34 E., T. 31 S., R. 35 E., T. 31 S., R. 34 E.) in the Three Rivers Resource Area (Map C, Affected Grazing Allotments Map). The Project Area covers 73,386 acres (53,738 acres public land, 19,648 acres private land). Approximately 26,075 acres of the area lies in the north end of the Steens Mountain Cooperative Management and Protection Area (CMPA) and encompasses approximately 32,592 acres of the Riddle Mountain and Kiger Herd Management Areas/Areas of Critical Environmental Concern (HMAs/ACECs) (Map D, Special Management Areas Map). There are no Wilderness Study Areas (WSAs) or Wilderness Areas within the Project Area. Elevation ranges from 4,200 to 7,000 feet. Roughly 70 percent of the Project Area has been encroached by juniper. Various forms of prescribed fire would be the primary management tool employed. The project would be implemented over a 7 to 15-year period (dependent upon funding, climatic conditions, and other agency priorities).

Rangeland plant communities represented in the Project Area are dominated by species such as low sagebrush (*Artemisia arbuscula*), mountain big sagebrush (*Artemisia tridentata ssp. vaseyana*), Wyoming big sagebrush (*Artemisia tridentata ssp. wyomingensis*), basin big sagebrush (*Artemisia tridentata ssp. tridentata*), and aspen (*Populous tremuloides*). Scattered within the dominant plant communities are inclusions of antelope bitterbrush (*Purshia tridentata*) and curlleaf mountain mahogany (*Cercocarpus ledifolius*). These two species are greatly utilized by wildlife for browse. Approximately 185 stream miles exist in the Project Area. Of the 185 stream miles, roughly 60 miles have perennial flowing water. The riparian vegetation along the creeks varies from hydric herbaceous (rushes, sedges) and woody (alder, willow, cottonwood, dogwood) communities to mesic community types associated with ephemeral flows. Western juniper (*Juniperus occidentalis ssp. occidentalis*) is encroaching upon all plant communities in the Project Area to various degrees.

In the past 130 years, western juniper has been expanding within its geographic range at unprecedented rates compared to any other time period during the last ~ 10,000 years (Miller and Tausch, 2001) and has invaded meadow, grassland, sagebrush-steppe, and riparian plant communities (Young and Evans, 1981). As juniper increases in site dominance, there is a resulting decline in shrubs and herbaceous vegetation (Burkhardt and Tisdale, 1969; Adams, 1975; Bunting, et al., 1999; Miller, et al., 2000; Roberts and Jones, 2000; Schaefer, et al., 2003). The increase in juniper density and distribution has often resulted in negative impacts to soil resources, plant community structure and composition, water and nutrient cycles, and wildlife habitat (Miller, et al., 2005). While a low level of juniper adds structural/vertical diversity to the landscape and increases habitat values for many species, a continual increase in dominance causes a general decline in species richness, wildlife abundance, and wildlife diversity (Miller, et al., 2005).

With historic grazing practices (which removed fine herbaceous fuels) and the start of fire suppression activities at the turn of the century, the role of fire in the Project Area was greatly reduced. Fire was the principal factor that controlled conifer encroachment into shrub-grassland communities in the Intermountain West prior to Euro-American immigration (110 to 130 years ago) (West, 1999; Miller and Tausch, 2001). As the frequency and intensity of fires across the landscape diminished, juniper expanded into shrub-grassland communities with an overall loss in ecosystem function and a dramatic alteration in historic biodiversity, hydrologic cycles, fauna, and nutrient cycling (Bates, et al., 1999).

Over the past 130 years, knowledge of land management in this region has increased dramatically. The Taylor Grazing Act of 1936 paved the way for improved livestock grazing management on public lands. Since then, many policies and directives have set guidelines for current grazing practices. Current grazing management is designed to maintain or move toward improved upland and riparian/wetland watershed functions, ecological processes, water quality, and habitats to support native, Threatened and Endangered and locally important species. While grazing practices have drastically changed, fire prevention programs continue to be a dominant force limiting the spread of wildfire. In recent times, modern fire control and prevention programs are probably the most important factor influencing juniper expansion (Burkhardt and Tisdale, 1976).

The increasing dominance of western juniper within the Project Area is evidenced by rangeland trend studies and permanent photo points. Encroached juniper has caused a reduction in the density, patch size, and health and vigor of mountain big sagebrush-bunchgrass, Wyoming big sagebrush-bunchgrass, basin big sagebrush-bunchgrass, low sagebrush-bunchgrass, aspen and riparian communities. Rehabilitation/restoration of these communities is possible with juniper control treatments. Success is dependent upon various factors including site selection, pretreatment understory, treatment method, and follow-up management (Miller, et al., 2005).

B. Purpose of and Need for Action

The primary purposes of the Five Creeks Rangeland Restoration Project are to reduce hazardous fuels and restore and/or increase system functionality (i.e., capture and storage of water, soil nutrient retention) through the restoration of shrub-steppe, aspen and riparian communities. Associated benefits of enhancing ecosystem functionality include improvement of sage-grouse, big game, and other Special Status and locally important species habitat, and improved forage for livestock, wild horses, and wildlife.

The need for action was predicted for this area during the writing of the Steens Mountain Cooperative Management and Protection Act (Steens Act) of 2000 as indicated by Section 113 (c) which encourages active management of western juniper on a landscape level. This need for action is based on the current condition of rangeland plant communities and hazardous fuels in the Project Area. Currently, many plant communities are in either early transition,[1] mid-transition[2] or late transition[3] to juniper woodlands. As woodland succession progresses from open stands of trees (early transition) to maximum canopy coverage (late transition) there is a resulting decline in the shrub and herbaceous understory. Often accompanying this decline are diminished wildlife habitat values, increased erosion, decreased forage, and altered soil nutrient distribution.

Specifically:

- There is a need to reduce encroached juniper within plant communities in the Project Area. Juniper invasion into sagebrush steppe, grassland, and riparian ecosystems can result in reduced density and diversity of shrubs, diminished perennial herbaceous vegetation, acceleration of erosional processes, and diminished soil moisture.

- There is a need to maintain or enhance important wildlife habitats (aspen, mountain mahogany, bitterbrush, riparian and sagebrush communities) that are degraded, being overtaken or lost due to competition from juniper.

- There is a need to improve plant forage species for mule deer, Rocky Mountain elk, antelope, wild horses, and livestock in plant communities undergoing conversion to juniper woodlands.

- There is a need to restore fire as a natural process within the Project Area to the extent feasible under constraints of human safety, private property, and resource values. The historic fire regime within the Project Area has been highly altered.

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[1] ***Early Transition*:** Juniper trees are present but shrubs and herbs are the dominant vegetation that influences ecological processes on the site (Miller, et al., 2005).
[2] ***Mid-Transition*:** Juniper trees are co-dominant with shrubs and herbs and all three vegetation layers influence ecological processes on the site (Miller, et al., 2005).
[3] ***Late Transition*:** Juniper trees are the dominant vegetation and the primary plant layer influencing ecological processes on the site (Miller, et al., 2005).

- There is a need to reduce accumulations of hazardous fuels within the Project Area to levels where cost-effective resource protection is possible and safety for firefighters is improved. Surface fuel loading is particularly high in 37 sites (3,428 acres) where juniper was previously cut and that now contain downed juniper slash.

Chapter III (Affected Environment) presents the baseline environmental conditions and a more detailed description of relevant resource components of the Project Area.

C. Conformance with Applicable Land Use Plans

The proposal is in conformance with the Steens Act. Section 113(c) of the Steens Act states: "The Secretary shall emphasize the restoration of the historic fire regime in the Cooperative Management and Protection Area and the resulting native vegetation communities through active management of Western Juniper on a landscape level. Management measures shall include the use of natural and prescribed burning."

The proposal is in compliance with the management direction established in the Record of Decision (ROD) for the Three Rivers Resource Management Plan/Final Environmental Impact Statement (RMP/FEIS) of 1992. The RMP objectives, applicable to the proposed action include:

- Restore, maintain or enhance the diversity of plant communities and wildlife habitat in abundances and distributions which prevent the loss of specific native plant community types or indigenous wildlife species habitat within the Resource Area (WL-7).

- Maximize the protection of life, property, and high value sensitive resources from the detrimental effects of wildfire (FM-1).

- Consistent with values at risk analysis, maximize the beneficial use of prescribed fire and wildfire to achieve other resource management objectives (FM-2). (The portion of the Project Area outside of the CMPA is designated in the RMP to allow only prescribed burning. Full suppression of natural fires is still to occur.)

- Maintain, restore or enhance the diversity of plant communities and plant species in abundances and distributions, which prevent the loss of specific native plant community types or indigenous plant species within the Resource Area (V-1).

The proposal is in conformance with the management direction established in the Steens Mountain CMPA RMP/ROD of 2005 and FEIS of 2004. Goals of the RMP applicable to the proposed action include:

- Maintain, restore, or improve riparian vegetation, habitat diversity, and geomorphic stability to achieve healthy, productive riparian areas and wetlands and associated structure, function, process and products that provide public land values such as forage, water, cover, structure, and security necessary to meet the life history requirements of fish and wildlife; public recreation and aesthetics; water quality and quantity; and livestock forage and water (Page RMP-24).

- Maintain or improve ecological integrity of old growth juniper woodlands. Maintain, restore, or improve the ecological integrity of mountain mahogany and quaking aspen stands/groves. Manage woodland habitat so that the forage, water, cover, structure, and security necessary to meet the life history requirements of woodland-dependent and woodland-associated wildlife species are available on public lands (Page RMP-27).

- Restore and maintain the integrity of ecosystems consistent with appropriate fire regimes and land uses (Page RMP-56).

- Maintain, restore or improve the integrity of desirable vegetation communities including perennial, native, and desirable introduced plant species. Provide for their continued existence and normal function in nutrient, water, and energy cycles (Page RMP-30).

This project is also consistent with Objectives and Desired Future Conditions for the Diamond Fire Management Unit (FMU) set forth in the Burns Interagency Fire Zone (BIFZ) Fire Management Plan (2004). This project is consistent with the Smyth-Kiger, Happy Valley, Riddle Mountain, Riddle/Coyote, and Burnt Flat Allotment Management Plans (AMPs), Evaluations, and Assessments for Rangeland Health and Guidelines for Livestock Management, in conformance with State, Tribal, and local laws, regulations, and land use plans and is compliant with the Greater Sage-Grouse Conservation Assessment and Strategy for Oregon.

CHAPTER II. ALTERNATIVES INCLUDING THE PROPOSED ACTION

A. No Action Alternative

Management under the no action alternative would proceed under the current Three Rivers RMP, Andrews/Steens RMPs/RODs, and all other relevant policy direction. A landscape level juniper treatment would not occur in the Project Area at this time. Conversion of rangelands to juniper woodlands within the Project Area would continue.

B. Proposed Action

The proposed action was developed by an Interdisciplinary (ID) Team, with representatives from all affected resources. The proposal is to utilize prescribed fire and mechanical treatments within the Project Area (Map B, Project Vicinity Map) to: 1) reintroduce fire to restore and/or maintain natural fire regimes;[4] 2) reduce hazardous fuels within the Project Area, especially within previously treated juniper cuts; 3) move the species composition and structure of big sagebrush-bunchgrass, low sagebrush-bunchgrass, aspen and riparian communities toward pre Euro-American immigration conditions; 4) improve big game, sage-grouse, and other locally important species habitat within the Project Area; 5) increase wild horse and livestock forage; and 6) improve watershed health.

Proposed landscape treatments in the Project Area are based upon the stage of woodland transition that six of the dominant plant communities; (low sagebrush-bunchgrass, mountain big sagebrush-bunchgrass, Wyoming big sagebrush-bunchgrass, basin big sagebrush, aspen, and riparian) are in. Proposed treatments are also based upon potential ecological impacts.

Hazardous fuels from 3,428 acres of previously cut juniper are also proposed for treatment. Currently, the downed juniper has elevated the risk of a high intensity wildfire event due to the increase of both living and dead vegetation after the units were cut. This elevated fuel load creates a hazardous situation for firefighters as well as a heightened chance of soil sterilization, greater opportunities for noxious weed establishment, and compromised watershed processes in the event of a wildfire occurrence.

Wildland fire use[5] may also be utilized within the CMPA boundary.

Designation of woodland harvest areas would be considered yearly, on a site-by-site basis.

Implementation and effectiveness monitoring would occur throughout the life of the project (Appendix H). Long-term rangeland monitoring of plant communities would continue over time to determine plant community changes and ecological health (Appendix H).

[4] ***Natural Fire Regime:*** A general classification of the role fire would play across a landscape in the absence of modern human mechanical intervention, but including the influence of aboriginal burning.

[5] ***Wildland Fire Use:*** The application of the appropriate management response to naturally-ignited wildland fires to accomplish specific resource management objectives in predefined designated areas outlined in fire management plans.

Low sagebrush-bunchgrass community

There are approximately 36,154 acres classified as potential low sagebrush sites within the Project Area. Of this, approximately 26,800 acres have been encroached by juniper (approximately 14,100 acres in early transition, 5,700 acres in mid-transition, and 7,000 acres in late transition).[6] The proposal is to treat 70 to 90 percent of the low sagebrush communities affected by juniper encroachment. The objective in these communities is to improve sage-grouse habitat and enhance site function in the low sagebrush community type.

Encroaching juniper would be cut, and in some cases, left. Leaving downed juniper with no follow-up treatment would only be considered when such an activity would not contribute appreciably to hazardous fuel loading. If, however, the downed juniper would create a hazardous fuel load, it would be jackpot burned[7] to reduce the hazard of a wildfire occurrence. Single-tree burning[8] may occur on a limited basis as an alternative method to cutting. Many sites within the low sagebrush-bunchgrass communities are not currently invaded by juniper and would not be targeted for treatment.

Low sagebrush-bunchgrass communities would not be targeted for broadcast burning.[9] However, low sagebrush-bunchgrass communities may be treated in a broadcast burn, as low sagebrush inclusions are sometimes intermingled with surrounding mountain big sagebrush plant communities.

Mountain big sagebrush-bunchgrass communities

There are approximately 22,329 acres classified as potential mountain big sagebrush-bunchgrass communities within the Project Area. Of this, approximately 20,780 acres have been encroached by juniper (approximately 4,330 acres in early transition, 9,930 acres in mid-transition, and 6,520 acres in late transition).

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[6] Woodland transition acreage in this document is based upon Ecological Soil Inventory data collected in the 1980s. The age of the data, and the methodology used, skews transition acreages and likely overestimates early transition acreage and underestimates mid and late transition stages. Actual transition acreage may change as verified during project layout.

[7] ***Jackpot Burning*:** Prescribed burning of concentrations of woody fuels during the late fall, winter or spring, preferably when the ground is partially frozen or wet. This method would burn the fine fuels, limit the ability of the fire to spread and prevent soil sterilization from excessive heat. It is conducive to maintaining the existing shrub and herbaceous plant species growing between the downed junipers. (For more detail see Activity Descriptions.)

[8] ***Single-Tree Burning*:** Prescribed burning of individual trees in late fall, winter, or spring, preferably when the ground is partially wet or frozen. This method would burn the fine fuels, limit the ability of the fire to spread and prevent soil sterilization from excessive heat. It is conducive to maintaining the herbaceous plant species growing under the junipers. (For more detail see Activity Descriptions.)

[9] ***Broadcast Burning*:** Prescribed burning at a time when the fire would carry through the unit, burning most of the available fuels. This would be applied in the late summer or fall when the fire would be controlled by pre-established control lines with ignition patterns in concert with the terrain features and wind direction as well as using natural barriers, and or diurnal temperatures and humidity changes. (For more detail see Activity Descriptions.)

Scattered mountain mahogany and bitterbrush are intermixed within some of the mountain big sagebrush-bunchgrass communities and all stages (early, mid, late) of juniper woodland transition exist therein. The proposal is to treat up to 90 percent of mountain big sagebrush-bunchgrass communities displaying juniper encroachment. The objective in these areas is to restore and enhance existing mountain big sagebrush-bunchgrass, mountain mahogany, and bitterbrush plant communities, and improve wildlife habitat. Areas where the mountain big sagebrush-bunchgrass community is an early stage of transition to juniper woodland would not be targeted for treatment. Potential treatments consist of an array of management actions designed to reduce the influence of encroaching juniper.

The two principal treatments used to treat the majority of these communities would be 1) cutting encroaching juniper followed by jackpot burning after juniper has cured or; 2) prescribed broadcast burning. In areas targeted for a broadcast burn, the objective is to burn 40 to 60 percent of the mountain big sagebrush-bunchgrass communities in early to mid-juniper woodland transition and 90 percent of mountain big sagebrush plant communities in mid to late transition. Remaining encroached juniper would then be cut and jackpot burned.

Mountain mahogany and bitterbrush stands greater than an acre in size would generally be pretreated prior to broadcast burning in order to reduce the possibility of excessive heat negatively affecting plant community recovery. Pretreatment options include cutting and jackpot burning, blacklining,[10] cutting juniper then pulling it away from bitterbrush and mahogany stands, and piling via hand or mechanized equipment prior to the broadcast burn. The recommendation to perform pretreatment and type of pretreatment would be developed during onsite project layout by an ID Team and/or a resource advisor.

<u>Wyoming big sagebrush and basin big sagebrush-bunchgrass communities</u>

There are approximately 3,237 acres of potential Wyoming big sagebrush-bunchgrass communities and approximately 5,845 acres of potential basin big sagebrush-bunchgrass communities in the project. Approximately 2,495 acres of potential Wyoming big sagebrush sites and 4,465 acres of potential basin big sagebrush sites have been encroached by juniper. Of the Wyoming big sagebrush sites, approximately 1,685 acres are in early transition, 740 acres are in mid-transition, and 70 acres are in late transition.

Approximately 2,100 acres of basin big sagebrush communities are in early transition, 2,015 acres are in mid-transition, and 350 are in late transition to juniper woodlands.

[10] ***Blacklining:*** Preburning of fuels adjacent to a control line before igniting a prescribed burn. Blacklining is usually done in heavy fuels adjacent to a control line during periods of low fire danger to reduce heat on holding crews and lessen chances for spotting across control line.

The proposal is to treat up to 90 percent of Wyoming and basin big sagebrush communities that are encroached by juniper. The objective in these areas is to enhance existing Wyoming and basin big sagebrush-bunchgrass plant communities and improve wildlife habitat. These communities are found primarily at lower elevations (below 5,000 feet) in the Project Area, and consequently, are more vulnerable to cheatgrass and noxious weed invasion.

Treatments would be designed to limit ground disturbance and noxious weed/cheatgrass establishment. The primary treatment in these communities would be cutting and jackpot burning, during the late fall, winter, and early spring. A limited amount of cutting and leaving the downed juniper in place may also occur. Leaving downed juniper with no follow-up treatment will only be considered when such an activity would not contribute appreciably to hazardous fuel loading. There are areas where the Wyoming and basin big sagebrush-bunchgrass communities are in an early stage of juniper encroachment and would not be targeted for treatment.

Aspen Stands

There are approximately 1,298 acres of potential aspen communities, of which 1,128 acres have been encroached by juniper. The proposal is to treat all aspen stands greater than one-eighth acre in size that display juniper encroachment. The objective is to protect and invigorate aspen stands to improve wildlife habitat and watershed health. Broadcast burning, juniper cutting followed by jackpot burning and juniper cutting with no follow-up burning are activities that may be utilized in this community type. Leaving downed juniper with no follow-up treatment would only be considered when such an activity would not contribute appreciably to hazardous fuel loading. The recommendation for the type of treatment would be formulated during onsite project layout by an ID Team and/or a resource advisor. This treatment may also include construction of woven wire exclosures around stands of aspen following the application of prescribed fire. Exclosures would remain in place until the terminal bud of suckers or saplings attain a height that is above the reach of most grazing animals as determined by rangeland monitoring.

Riparian Communities

There are approximately 185 stream miles (120 miles on public land, 65 miles on private land) in the Project Area (Map B, Project Vicinity Map). Of the 185 stream miles, roughly 60 miles have perennial flowing water. The proposal is to treat all riparian communities displaying any juniper encroachment. Stream reaches not undergoing transition to juniper woodland would not be targeted for treatment. The objective is to reduce competition between juniper and deciduous woody and hydric herbaceous riparian plant communities along perennial and intermittent stream reaches. All treatments would be implemented with the intention of avoiding impacts to streams and wetlands while meeting resource objectives. Riparian and wetland areas would generally receive some form of additional treatment before or after a broadcast burn.

These additional treatments would be performed to reduce the possibility of excessive heat from the broadcast burn slowing plant community recovery.

Additional treatment options include cutting and jackpot burning before or after a broadcast burn, blacklining prior to the broadcast burn, and hand piling and burning prior to the broadcast burn. Cutting and jackpot burning and leaving cut juniper in place without broadcast burning are also options. Leaving downed juniper with no follow-up treatment would only be considered when such an activity would not contribute appreciably to hazardous fuel loading. The recommendation to treat a riparian area and which treatments to apply would be determined during onsite project layout by an ID Team and/or resource advisor. This treatment may also include construction of woven wire exclosures around cottonwood stands and/or planting deciduous woody vegetation following the application of prescribed fire. Exclosures would remain in place until suckers or saplings attain a height that is above the reach of most grazing animals as determined by rangeland and/or riparian monitoring.

Hazardous Fuels

Within the Five Creeks Project Area, there is a total of 3,428 acres of previously cut juniper on 37 different sites (Map E, Completed Cut Units Map). The proposal is to treat 100 percent of the sites that are a hazardous fuel threat. The objective is to reduce the susceptibility of these sites to high-intensity wildland fire. Sites containing downed juniper would be treated with various forms of prescribed fire to reduce hazardous fuels. Jackpot burning and broadcast burning would be the primary forms of prescribed fire utilized under this treatment. Due to a lack of fine fuels (e.g., needles), it may be necessary to machine pile and burn portions of the cut units in order to accomplish this management objective. An ID Team or resource advisor would recommend the types of prescribed fire to be utilized on a unit-by-unit basis.

Detailed Activity Descriptions

Prescribed Burning

Prescribed burning would be used to varying degrees in all resource treatments. These treatments would include activities such as jackpot burning, broadcast burning, piling (machine or hand) and burning, and/or single-tree burning.

Burning prescriptions[11] would vary depending on specific objectives and would allow adequate fire behavior to reduce the stocking of fully and partially developed juniper woodlands, and reduce size classes of dead and down fuel within previously cut juniper control units and cut/piled units. Piling and burning, and single-tree burning would occur in areas where jackpot burning and broadcast burning would not meet resource objectives. This might include areas where fire-sensitive assets such as range improvements or cultural resources occur. This treatment may also be used to improve the effectiveness of holding actions[12] near a unit or property boundary.

Tools such as drip torches, fusees, All-Terrain Vehicle (ATV) ignition, aerial ignition, and other firing devices are typically used to ignite prescribed burns. Broadcast burns are generally implemented in the fall (September, October) to moderate undesirable fire behavior. Roads, natural barriers, and mechanically-constructed fireline may be utilized as fire breaks at the boundaries of burning units. Two-track 4-wheel drive roads that are positioned along burn unit boundaries may be bladed to improve their ability to function as a control line. Broadcast burning operations would be monitored to ensure that Project Design Elements (PDEs) are properly observed and resource objectives are being achieved. Once resource objectives are attained within targeted vegetation communities, no remaining acres within that community type would be treated by broadcast burning within the burn units. All burn plans would include an escaped fire suppression plan and a smoke management plan. Prior to beginning operations requiring any fuel tanks or fuel handling at the site a spill contingency plan would be developed and submitted to the authorized officer.

Jackpot Burning

Jackpot burning is the application of prescribed fire to concentrations of woody fuels typically during the time of year when the probability of fire spread is very low (in the late fall through early spring when soil moisture is high or the ground is frozen). Jackpot burning is the method used in units where fuel loads are discontinuous or the ability of fire to spread is low. Jackpot burning may also be applied in areas where natural fuel concentrations exist in isolated areas. This method would burn the fine fuels, limit the ability of the fire to spread and prevent soil sterilization from excessive heat. It is conducive to maintaining the shrub component on the site and the herbaceous plant species growing under the downed junipers.

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[11] ***Prescription:*** A plan specifying management objectives to be obtained, and air temperature, humidity, season, wind direction and speed, fuel, and soil moisture conditions under which a fire would be started or allowed to burn.

[12] ***Holding Action:*** Any action taken to stop the spread of fire.

Jackpot burning would be a principal activity throughout sagebrush-bunchgrass dominated plant communities where prescribed broadcast burning is not applicable. It may also be utilized within the units of previously cut juniper that exist throughout the Project Area or as preparation for holding a broadcast burn. Jackpot burning may require up to 2 years of growing season rest after implementation. The duration of the rest period would be determined by the Field Manager based on rangeland monitoring by a BLM ID Team of plant community response.

Broadcast Burning

Broadcast burning is the controlled application of fire to wildland fuels within a predetermined area during specific environmental conditions in order to attain resource management and fuels reduction objectives. Broadcast burning would be another form of prescribed fire applied under the proposed action.

Portions of shrubland communities that are in middle to late juniper woodland transitional stages would require mechanical pretreatment to create ladder fuels that allow fire to spread. Individual trees would be periodically felled against standing trees and allowed to cure; creating a ladder allowing ground fire to move into canopies of standing uncut trees. Sites not supporting large trees typical of communities in earlier stages of juniper woodland development would not require mechanical treatment prior to application of prescribed fire. Other pretreatment activities that may occur within or near broadcast burn units include wetlining,[13] blacklining, jackpot burning, and handline construction around interior leave islands and fire-sensitive assets such as range improvements or cultural resources or to decrease heat from the broadcast burn in some communities. Holding operations near property boundaries may be accomplished with pretreatment using small amounts of jackpot burning, juniper cutting, and/or piling and burning.

Scheduling of burning during the 7 to 15-year implementation period is dependent upon resource objectives, weather, fuel conditions, project funding, and arrangements with grazing permittees, and other private property owners. These factors, especially weather, make it difficult to accurately project the number of acres burned in a given year. As described in PDE #8, broadcast burning operations require one growing season of rest from livestock grazing prior to treatment and at least two growing seasons of rest following treatment. The duration of the rest period would be determined by the Field Manager based on rangeland monitoring by a BLM ID Team of plant community response.

[13] ***Wetline:*** A line of water, or water and chemical retardant, sprayed along the ground, which serves as a temporary control line from which to ignite or stop a low-intensity fire.

Pile Burning

Mechanical piling and/or hand piling would be used to reduce fuel loading and continuity in previously cut juniper units. However, these actions may also occur in other areas. Machine piles are usually 12 feet tall by 16 to 22 feet wide and are constructed by grapple equipped excavators or dozers. Piling would take place when ground is frozen, or during dry soil conditions. Piles would be burned within 2 years of construction during late fall, winter, or spring, preferably when the ground is frozen or wet. A mixture of native and nonnative grasses, forbs, and shrub species would be seeded at these piles following burning.

Single-Tree Burning

Single-tree burning involves ignition of individual trees with backpack flame throwers, terra torches, torches mounted to vehicles or ATVs, or other firing devices. In this treatment, juniper trees that are less than 8 feet tall and/or basally sprouting multi-stemmed trees would be burned individually to prevent recovery from manual or mechanical cutting. Only torching of individual trees would occur under this treatment to prevent fire movement from crown to crown. Single-tree burning would be an activity employed primarily in low sagebrush-bunchgrass communities. Single-tree burning would have limited application under the proposed action and would be implemented on a relatively infrequent basis.

Juniper Cutting – Fall and Leave (No burning)

In some situations, juniper would be felled and left on site under the proposed action. There would be no follow-up burning when this treatment is applied. This treatment would only be applied where risks associated with increasing hazardous fuels are considered to be low (determined on a site-specific basis), such as in low sagebrush communities in early stages of transition to juniper woodland or as a strategy to reduce juniper encroachment within stands of mountain mahogany, bitterbrush, aspen and riparian communities.

Wildland Fire Use

Within the CMPA boundary, wildland fire use may be applied. Wildland fire use is the management of naturally-ignited fires to achieve resource benefits. Wildfires would be evaluated based on weather, plant community, and social factors. If no human lives are threatened, and the projected fire effects are acceptable, the wildfire would be managed for resource benefits. Typically, this treatment would occur in areas where resource damage is expected to be low and fire spread would be minimal (e.g., higher elevation, late transition juniper stands).

Project Design Elements

1. Cultural values would be protected throughout the life of the project. Archaeological sites would be avoided within the mechanical treatment units and activity-generated fuels would not be piled within the boundaries of sites. Sites with combustible constituents would be protected during the deployment of prescribed fire by blacklining resources and use of appropriate ignition techniques. The District Fire Archaeologist would review burn plans and make recommendations prior to project implementation.

2. Project implementation would cease if new cultural resources are encountered within treatment areas and the District Archaeologist would be notified. Prior to resuming work, historic property documentation and evaluation would be completed. Mitigation plans would be developed in consultation with the State Historic Preservation Office (SHPO) if necessary.

3. Special Status plant species would be protected throughout the life of the project. Special Status plants would be avoided within mechanical treatment units if necessary. Fire intolerant sensitive plants would be protected during deployment of prescribed fire by blacklining resources and use of appropriate ignition techniques. The District Fire Botanist would review burn plans and make recommendations prior to project implementation.

4. Special Status wildlife species (terrestrial, avian, and aquatic) habitat would be protected throughout the life of the project. Structures or areas with Special Status Species (SSS) habitat value identified during wildlife surveys would be protected or avoided during project implementation. The District Fire Wildlife Biologist would review burn plans and make recommendations prior to project implementation.

5. Big game hiding and thermal cover within aspen and mountain mahogany treatment units would be maintained.

6. Prior to treatment of prescribed fire and mechanical treatment units, noxious weed populations in the area would be inventoried. Weed populations identified in or adjacent to the Project Area would be treated using the most appropriate methods in accordance with the Burns District Noxious Weed Management Program Environmental Assessment/Decision Record (EA/DR) OR-020-98-05.

7. The risk of noxious weed introduction would be minimized by ensuring all equipment (including all machinery, 4-wheelers, and pickup trucks) is cleaned prior to entry to the site, minimizing disturbance activities, and completing follow-up monitoring, for at least 3 years, to ensure no new noxious weed establishment. Should noxious weeds be found, appropriate control treatments would be performed in conformance with the Burns District Noxious Weed Program Management EA/DR OR-020-98-05.

8. Livestock grazing would not occur for at least two growing seasons (May 1 to June 30) in pastures treated with prescribed broadcast fire. An additional season of rest from grazing prior to burning may be necessary to allow for development of a fine fuel ignition source.

9. Livestock grazing may not occur for a period of up to two growing seasons (May 1 to June 30) in pastures treated with prescribed jackpot burning.

10. Sites lacking sufficient understory species, such as fully-developed juniper woodlands, or areas that have burned at a high severity may require seeding following a prescribed fire treatment to attain the desired post-fire response. Mixtures of native and nonnative grass, forb, and shrub seed that are adapted to the treated sites may be applied to designated areas with aerial or ground-based methods. Candidate sites for seeding would be determined on a case-by-case basis as monitoring data is gathered.

11. Following accomplishment of mountain big sagebrush community treatment objectives, treated areas must attain 12 to 15 percent shrub cover before any additional broadcast burning treatment of such sites would be considered in the Project Area.

12. Mechanical cutting of juniper with old growth characteristics or obvious wildlife occupation (cavities or nests) would be avoided. Protection of such trees during all prescribed fire operations would be considered where feasible under the constraints of human safety. Retain approximately 10 percent of expansion juniper to provide hiding and thermal cover for mule deer and elk and to provide future old growth.

13. Larger tracts of early transition mountain big sagebrush communities, identified by the staff wildlife biologist or resource advisor during layout, would either be left untreated, or treated by cut and jackpot burned or single-tree burning to retain mountain big sagebrush habitat.

14. Invasive juniper would be treated aggressively within Greater sage-grouse 2-mile lek buffers. Treatment methods would be limited to cutting and individually burning juniper within the buffer area. Treatments within the 2-mile buffer area would not take place from March 1 to June 15.

15. Prescribed burning would follow the Oregon State Smoke Management Plan in order to protect air quality and reduce health and visibility impacts on designated areas.

16. Dispersed campsites identified within the Project Area would not be intentionally burned during broadcast burn operations. Protection would be considered for sufficient size leave islands around identified campsites to protect recreation values.

17. As soon as practicable after completion of all project activity within a specific area, roads damaged by project vehicles would be maintained and brought back to their previous standard.

18. No more than 15 percent of any given watershed would be burned (actual blackened acres) within the Project Area per year.

C. Alternatives Considered but Eliminated from Further Analysis

1. A Removal of Grazing Alternative in conjunction with juniper cutting and various forms of prescribed fire was considered but eliminated from detailed analysis. Current grazing practices in the Project Area are not considered a causal factor for juniper establishment, and the cessation or modification of such activities would not reduce encroached juniper.

The main impact of historic domestic livestock grazing was the overall removal of fine fuels, the major carrier of fires in much of the area. Invasion of juniper into big sagebrush communities appears to be directly related to the cessation of periodic fires (Burkhardt and Tisdale, 1976).

An excessive level of grazing was documented near the Project Area in 1902, by Dr. David Griffiths, during a tour of northern Nevada and southeastern Oregon. The course of the tour led "across and somewhat below the sources of the Blitzen, Mud, Indian, and Cocoamongo (Cucamonga) creeks (Griffiths, 1902)." These creek sources are 3 to 15 miles from the Five Creeks Rangeland Restoration Project Area and therefore, Griffiths' description should also reflect the condition of the Project Area in 1902.

Griffiths states, "The most closely pastured region visited was Steins (Steens) Mountains. On the whole trip of three days we found no good feed, except in very steep ravines, until we reached the vicinity of Teger (Kiger) Gorge…In places from Ankle Cap to Nuttersville, a sheep supply camp, there was practically no more feed than on the floor of a corral. We passed two areas at least 2 miles in extent in which even the surface of the ground was reduced to an impalpable powder."

In his summary, Griffiths states, "The public ranges of the region are in many places badly depleted and furnish at the present time not over one-third of the feed which they once did. This is directly traceable to overstocking…" Griffiths made a conservative estimate of 182,500 sheep, or over 450 animals per square mile, on Steens Mountain during the summer season. In addition, the French-Glenn estate and the Pacific Live Stock Company, along with half a dozen smaller ranches, ran their cattle in the same region as much as possible. These conditions are depicted below in Figures 1 and 2.

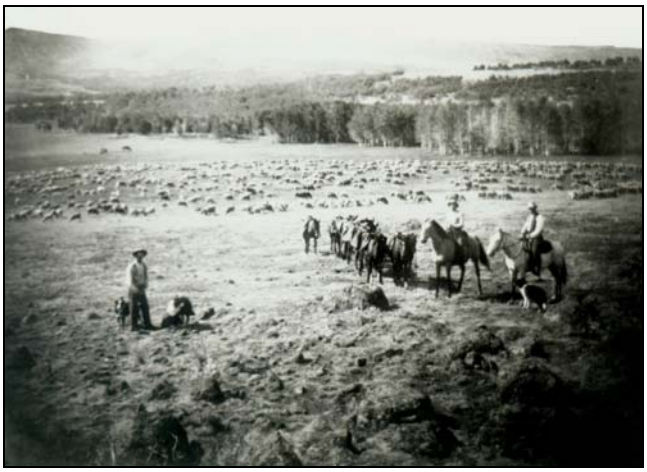

Figure 1: Sheep grazing on Steens Mountain around the turn of the century. Photo reflects historic grazing levels in the vicinity of the Project Area.

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Figure 2: Fish Lake, Steens Mountain. Photo reflects historic utilization levels near the Project Area around the turn of the century.

Not until 1934 was the passage of the Taylor Grazing Act. The Preamble to the Act defines it as, "An Act to stop injury to the public grazing lands by preventing overgrazing and soil deterioration; to provide for their orderly use, improvement, and development; to stabilize the livestock industry dependent upon the public range; and for other purposes." By 1936, the transient sheep outfits (those without base property to support their flocks during the winter) were forced off the (Steens) mountain (Bill Bradeen, 1972).

Eventually, range surveys conducted during 1955 and 1956 determined the carrying capacity of the Federal range within the Diamond Unit, which included the main allotments within the Project Area. The range survey data was then used in 1958 for the purpose of the Diamond Unit Adjudication. At this time, the overall reduction in the Diamond Unit was 6.03 percent. The Animal Unit Month (AUM)[14] preference was set per range user but the adjudication did not describe a season of use.

[14] ***Animal Unit Month (AUM):*** Amount of forage needed to sustain one cow and her calf, one horse, or five sheep or goats for a month.

In 1979, the Drewsey Grazing Management Program Final Environmental Statement (ES) continued a livestock grazing program for the Drewsey ES area (which covered the Five Creeks Project Area) that included establishing an allocation of forage for livestock, wildlife, wild horses, and watershed. Intensive livestock management was to be implemented through AMPs which include grazing systems, construction of range improvement projects, and a program of studies and evaluation. The ES states that the AMP "designates the season of use and the number of livestock permitted on the range… the provisions of the AMP become a stipulation of the grazing permit." The AMPs discussed in the ES, "must include one or more planned grazing treatments which use livestock grazing to bring about [positive] changes in the kind or amount of vegetation." The ES established a 50 percent or less target utilization level on native uplands and riparian areas and less than 60 percent on crested wheatgrass seedings.

Since the 1979 Drewsey ES, AMPs have been written for each of the allotments within the Project Area.

Other policy and land management plans that have been adopted since the Drewsey ES include, but are not limited to; the 1992 Three Rivers RMP, the 1997 Standards for Rangeland Health (further referred to as the Standards) and Guidelines for Livestock Grazing Management (further referred to as Guidelines) for Public Lands Administered by the Bureau of Land Management in the States of Oregon and Washington (refer to Appendix I for Standards descriptions), and the CMPA RMP/ROD, July 2005. Each document gives direction and guidance on proper multiple resource management of our public lands.

The Standards and Guidelines discussed above are analyzed through a formal allotment evaluation. Based upon the level of complexities and resource concerns of the allotment, an evaluation is completed on a 5 or 10-year schedule. Through the formal evaluation process, an ID Team assesses the achievement of resource objectives set for the allotment and determines whether the Standards have been achieved and Guidelines have been conformed to. Additional resource objectives are designed if necessary and recommendations for improved management of any identified resources are declared. These Standards ensure grazing management that provides for the ecological health of rangelands.

Refer to Chapter III, B (4) for results of the Standards and Guidelines assessments for each allotment within the Project Area.

While grazing management on Steens Mountain has improved dramatically since 1902, encroached juniper continues to be a problem. As discussed previously, modern fire control and prevention programs are probably the most important factor currently influencing juniper expansion (Burkhardt and Tisdale, 1976).

Soule', et al. (2004), found that juniper establishment rates are generally accelerated regardless of the active disturbance regime. Ongoing grazing is not a required mechanism to promote increasing woodiness on arid western rangelands (Soule' and Knapp, 1999). Burkhardt and Tisdale (1976) found little relationship between range condition of big sagebrush-grass stands and the rate of juniper invasion. Invasion of juniper into big sagebrush communities appears to be directly related to the cessation of periodic fires (Burkhardt and Tisdale, 1976). Adopting a Removal of Grazing management regime in the Project Area would not reduce encroached juniper and, therefore, would not meet the purpose and need for action.

Adopting a Removal of Grazing management regime in the Project Area would also not conform to direction in, or meet objectives of, the Steens Act which states as one of its purposes: "To promote viable and sustainable grazing and recreation programs on private and public lands," ((Section 1 (b) (11)). The Act also declares one of the purposes of the CMPA is "to promote grazing, recreation, historic, and other uses that are sustainable…" (Section 102 (b) (2)). A Grazing Removal alternative would also not be in conformance with the Three Rivers RMP/FEIS of 1992 or the Steens Mountain CMPA RMP/ROD of 2005 and FEIS of 2004.

Implementing a Removal of Grazing alternative could have serious implications to the social and economic values of the communities surrounding the Project Area and Harney County. The viability and sustainability of the ranches that hold grazing permits in the Project Area could decline as a large part of the lands that they rely on become unavailable. Heavier grazing on the upper reaches of critical riparian areas within and surrounding the Project Area may occur, as much of which is privately owned. A "Grazing Removal alternative" does not consider the total ecosystem on public and private land.

While a "Removal of Grazing Alternative" has been considered, eliminating grazing from the Project Area would not meet the purpose and need for action, would increase livestock pressure on critical riparian areas, would negatively impact socioeconomics of the area, and would not conform to the Steens Act. Therefore, this alternative will not be addressed further in this document.

CHAPTER III: AFFECTED ENVIRONMENT

A general description of the existing environment for the Project Area can be found in the Three Rivers RMP/FEIS and Andrews/Steens RMP FEIS.

Critical Elements: The following critical elements of the human environment have been analyzed in the Three Rivers RMP/FEIS and Andrews/Steens RMP FEIS, and are not known to be present in the Project Area or would not be affected in any way by implementation of the proposed action: Wilderness, WSAs, Wild and Scenic Rivers, Flood Plains, Paleontology, Prime or Unique Farmlands, Hazardous Materials.

Noncritical Elements: Noncritical elements that are not known to be present in the Project Area or would not be affected in any way by implementation of the proposed action are Forestry/Woodlands, Minerals and Reclamation and Wilderness Characteristics.

The following critical element is not discussed in the Three Rivers RMP/FEIS:

Environmental Justice: Executive Order 12898 requires that Federal agencies adopt strategies to address environmental justice concerns within the context of agency operations. Implementation of the proposed action would not result in disproportionately adverse human health or environmental effects on minority or low-income populations. Therefore, Environmental Justice will not be addressed further in this document.

This section describes site-specific affected environmental components and elements not described in depth in the Three Rivers RMP/FEIS or Andrews/Steens RMP FEIS. The discussion is divided into critical and noncritical elements. The following critical elements are present and potential effects of the Proposed Action on these resources will be analyzed in this document: Air Quality, Water Quality, Wetlands and Riparian, Migratory Birds, SSS (flora and fauna), Noxious Weeds, Cultural Heritage, American Indian Traditional Practices, ACECs/Wild Horses and Burros. Noncritical elements which are present and will be analyzed in this document are Soils, Vegetation, Wildlife, Livestock Grazing Management, Recreation, Visual Resource Management (VRM), Social and Economic Values, Fire Management, Transportation and Roads, and Biological Soil Crusts (BSCs).

A. Critical Elements

1. Air Quality

Air quality in the Project Area currently meets or exceeds air quality standards outlined by the Oregon Department of Environmental Quality (ODEQ). Due to the long distance from large metropolitan areas and factories, ambient air quality is generally good with few particulates or other pollutants. Weather systems move into the Project Area generally from the west or southwest and exit the Project Area to the east or northeast. Periods of degraded air quality can occur though typically these events are short lived and are associated with development of a stable air mass and/or cold air inversion over the Project Area. Smoke from wildfires is also a cause of degraded air quality due to particulate matter contained in smoke. The Project Area is included in the area designated as a "clean air source" by the Grand Canyon Visibility Transport Commission.

2. Water Quality, Wetlands and Riparian

The proposed project includes portions of the Donner und Blitzen, Harney-Malheur Lakes, Upper Malheur and Alvord subbasins. Riparian conditions were analyzed at the 6th-field Hydrologic Unit (HUC)[15] or 6th level sub-watershed. There are nine, 6th-level HUCs within the Project Area.

Analysis of stream condition was based on an assessment of Proper Functioning Condition (PFC)[16] that was evaluated for 12 stream reaches (22.25 miles of stream) between 1998 and 2005. Seven and one-half stream miles were rated at PFC and 5 miles were rated Functioning at Risk (FAR) with an upward trend. Nine and three-quarter miles were rated as FAR with no apparent trend.

Streams in the Project Area have been evaluated for water quality impairment as directed by the ODEQ. Riddle Creek and Paul Creek are on the ODEQ's 303(d) list of water quality impaired streams for exceeding the 68 ºF water temperature standard for salmonid rearing. No other pollutants are documented in the streams within the Project Area.

Below are brief descriptions of the current conditions of 6th level sub-watersheds within the Project Area.

Paul Creek 6th Field HUC

Most of Paul Creek is under private ownership. The PFC Assessment was conducted along the public portion of Paul Creek. This reach was identified as FAR with an upward trend. This rating is due to the presence of small headcuts. Diverse composition of riparian vegetation was present and vegetative cover appeared to be in an upward trend. This creek is listed as water quality impaired on the State's 303(d) list.

Upper Riddle Creek 6th Field HUC

PFC Assessments were conducted on Riddle Creek and Coyote Creek.

[15] ***HUC - Hydrologic Unit Code.*** A hydrologic unit is a drainage area delineated to nest in a multi-level, hierarchical drainage system. Its boundaries are defined by hydrographic and topographic criteria that delineate an area drained by a river system, a reach of a river and its tributaries in that reach, a closed basin(s), or a group of streams forming a coastal drainage area.

[16] ***Proper Functioning Condition Assessment:*** A methodology for assessing the physical function of riparian and wetland areas. There are three main ratings; Proper Functioning Condition (PFC), Functioning at Risk (FAR) upward or downward trend and nonfunctioning.

Five reaches of Riddle Creek were surveyed over 9 miles. Four reaches were FAR and characterized as limited by the type or amount of riparian vegetation present. The fifth reach was at PFC. In 2004, additional data measuring the riparian vegetation resources along Riddle Creek in the Happy Valley Allotment (#5309) were collected using the 2000 Alma Winward Greenline method. Community types along and perpendicular to the creek's edge were measured, ranked, and scored according to their successional status and ability to stabilize the streambank. Streambank stability was rated as good, successional status along the streambank was rated as late seral and the riparian zone cross section was rated as mid-seral. Riddle Creek is listed as water quality impaired on ODEQ's 303(d) list.

Three reaches of Coyote Creek were surveyed covering 5 miles. For the most part, the riparian zone is in good condition with two reaches rated as PFC and one rated as FAR with an upward trend. The reach rated as FAR lacked woody riparian species. Coyote Creek exceeds the 68.0 ºF temperature standard. The 7-day average maximum temperature was 70.8 ºF.

Smyth Creek 6th Field HUC

PFC Assessments were conducted along Smyth and Frog Creeks in this sub-watershed. Two reaches totaling 5.8 miles along the public portions of Smyth Creek were assessed. Two and nine-tenths miles were rated as PFC; the remaining 2.9 miles were rated as FAR with an unknown trend. The reach rated as FAR was characterized by a lack of sufficient deep rooted vegetation capable of withstanding high flow events. There were also some small headcuts present. Four temperature monitoring sites along Smyth Creek were established in 2005. The 68.0 ºF temperature standard was exceeded at the upstream and downstream sites (where Smyth enters and exits public land); however, the standard was met at the two middle sites.

Frog Creek was rated as FAR with an unknown trend. Diverse riparian vegetation was present; however, there was a headcut present. An upstream road crossing was also adding sediment to the channel. Temperature data were not collected along this creek.

Little Kiger Creek 6th Field HUC

A large portion of the streams in this sub-watershed are under private ownership. The public section of Deep Creek within the Project Area was rated as PFC. Water temperature data were not collected along Deep Creek within the project boundary.

Data measuring the riparian vegetation were collected on Yank Creek in 2003 using the 2000 Alma Winward Greenline method. Streambank stability was rated as moderate, the successional status along the streambank was rated as early seral and the riparian zone cross section was rated as early seral. In 2004, this creek was fenced and placed into a riparian sensitive grazing system. Temperature data collected on Yank Creek indicates attainment of the 68.0 ºF water temperature standard.

Only .2-mile of Mahon Creek within the project boundary flows across public lands; the remainder of the creek is privately owned. No riparian or water quality data have been collected along these reaches.

Camp Creek, Swamp Creek, Kiger Creek, and Squaw Creek 6th Field HUCs

Small portions of these sub-watersheds fall within the Project Area. The streams within the project boundary on public land are intermittent or ephemeral. No data have been collected in these sub-watersheds within the project boundaries.

3. Migratory Birds

The Point Reyes Bird Observatory conducted approximately 200 point count surveys that were either within the Project Area or in like habitat in the general vicinity of the Project Area. Sixty-eight bird species were identified during these counts. Table 1.0 lists the species identified during the point count surveys. All of these species, and probably a few more, are expected to inhabit all or portions of the Project Area. Some of these species such as northern goshawk, Swainson's hawk, and Greater sage-grouse are also considered SSS and will be discussed in that section.

Table 1.0. Migratory Bird Species likely to inhabit the Five Creeks Project Area

American Crow	Common Raven	Long-billed Curlew	Say's Phoebe
American Goldfinch	Common Snipe	Mountain Bluebird	Sharp-shinned Hawk
American Kestrel	Cooper's Hawk	Mountain Chickadee	Song Sparrow
American Robin	Downy Woodpecker	Mourning Dove	Stellar's Jay
Ash-throated Flycatcher	Dusky Flycatcher	Northern Flicker	Swainson's Hawk
Black-throated Gray Warbler	European Starling	Northern Goshawk	Tree Swallow
Brewers Blackbird	Gray Flycatcher	Northern Harrier	Turkey Vulture
Brewer's Sparrow	Green-tailed Towhee	Northern Rough-winged Swallow	Vesper Sparrow
Brown-headed Cowbird	Hermit Thrush	Dark-eyed Junco	Violet-green Swallow
Bushtit	Horned Lark	Pine Siskin	Warbling Vireo
California Quail	House Finch	Prairie Falcon	White-breasted Nuthatch
Canyon Wren	House Wren	Red-tailed Hawk	White-crowned Sparrow
Cassin's Finch	Killdeer	Red-winged Blackbird	Western Kingbird
Cassin's Vireo	Lark Sparrow	Rock Wren	Western Meadowlark
Chipping Sparrow	Lazuli Bunting	Ruby-crowned Kinglet	Western Wood-Peewee
Chukar	Lesser Goldfinch	Sage Thrasher	Yellow Warbler
Common Nighthawk	Lincoln Sparrow	Savanna Sparrow	

Neotropical migratory birds use all habitat types in the Project Area with some birds being habitat specific while others use a variety of habitats. Grassland species that inhabit the Project Area include, but are not limited to, vesper sparrow and horned lark. These species generally nest on the ground in open areas. Sagebrush species include Brewer's sparrow, white-crowned sparrow, green-tailed towhee, sage thrasher, and sage sparrow. Most of these species nest in the sagebrush canopy but may also nest at the base of a shrub. Woodland species include gray flycatcher, dusky flycatcher, dark-eyed junco, bushtit, Cassin's finch, pine siskin, western wood-peewee, and chipping sparrow. Species that may be found in two or more habitats include American robin, brown-headed cowbird, Lincoln's sparrow, lark sparrow, and western meadowlark. These species nest in many different habitats and nest sites are found from the ground to trees and willows. Brewer's sparrow, sage sparrow, Swainson's hawk, and long-billed curlew are all Birds of Conservation Concern for the Great Basin Region. Swainson's hawk and long-billed curlew will be addressed under the SSS section. Brewer's sparrow and sage sparrow nest in habitats with varying degrees of sagebrush density. Habitat quality in the Project Area for these species has been degraded by juniper encroachment.

4. Special Status Species (Flora, Fauna)

Flora:

Portions of the Project Area have been surveyed by BLM for the presence or absence of Special Status plant species. Large portions of the Project Area still require botanical surveys. These surveys would be conducted in the appropriate season prior to any project implementation.

Known Special Status plant populations occur in the Project Area. These known populations represent two species which are shown in the table below. Status definitions are located below Table 2.0.

Table 2.0. Known Special Status Plant Species in the Project Area
(Burns District Geographic Information System (GIS) Database)

Scientific Name	Common Name	Federal Status	BLM Status	ONHP List
Carex cordillerana	Cordilleran sedge	-	A	L2
Penstemon seorsus	Short-lobed beard tongue	-	T	L4

BLM Status:

S = Sensitive – species that could easily become endangered or extinct in a State, are restricted in range and have natural or human-caused threats to survival.
A = Assessment – species not currently eligible for official Federal or State status, but are still of concern and need protection or mitigation.
T = Tracking – species that may become of concern in the future, but more information is needed to determine status for management purposes.

ONHP Status:

L1 – taxa threatened with extinction or presumed to be extinct throughout their range.
L2 – taxa threatened with extirpation or presumed to be extirpated from the State of Oregon.
L3 – taxa of conservation concern that need more information to determine status.
L4 – taxa which are of concern because they are rare and stable or common and declining.

This list may change if botanical specialists locate additional SSS during the remaining botanical surveys.

Fauna – Wildlife:

SSS considered for this Project Area include Greater sage-grouse, Northern goshawk, Swainson's hawk, sage sparrow, Preble's shrew, and several species of bats. Sage sparrows are discussed above in the Migratory Bird Section. Other SSS that may occur in the Project Area include bald eagle, Columbia spotted frog, long-billed curlew, western burrowing owl, and wolverine. These species are either not known to occur within the Project Area or will not be affected by enacting either alternative. Therefore, these species will be discussed in this section, but will not carry through to the environmental impacts section (Chapter IV).

Bald eagles (Federal listed Threatened, winter residents only) have been observed around the Diamond and Happy Valley areas, which are located a few miles north of the Project Area. A few bald eagles have been observed roosting within these valleys on private land. There are no known winter roost sites within the Project Area. No bald eagles sightings have been reported within the Project Area, but use may occur as transient birds from the winter roost sites on private land forage and scavenge throughout the day. This use would be considered very infrequent as the eagles generally spend the entire day foraging and scavenging in the valley. If a bald eagle winter roost site is discovered at any time during the project, mitigation measures will be taken to protect it.

Potential habitat for Columbia spotted frogs (Federal Candidate for listing as Threatened or Endangered) does exists within the Project Area. Potential habitat for Columbia spotted frogs includes slow moving or still water around springs, ponds behind beaver dams or other ponds, and shallower vegetated areas in lakes. However, there have been no known sightings of Columbia spotted frogs within the Project Area. Much of the higher probability habitat has been inventoried for spotted frogs with no specimens being observed.

Long-billed curlews are primarily grassland species that nest in many of the crested wheatgrass seedings and native grassland or meadow vegetation types in the vicinity of the Project Area. The birds use flooded native hay meadow areas for feeding and are quite common in the crested wheatgrass seedings in the area.

Long-billed curlews may also be found within some of the sites within the Project Area that have received wild or prescribed fire. Existing habitat for long-billed curlew will not be targeted for treatment in any alternative. Habitat for long-billed curlew will likely not be affected by enacting either alternative.

Western burrowing owls are found in grassland, salt desert shrub, and shrub-steppe habitats. Burrowing owls in Oregon tend to use burrows for nesting which were previously excavated by badgers. Badgers are a major predator of burrowing owl eggs and young. No burrowing owls have been observed in the Project Area. It is unlikely that burrowing owl nest sites would occur in areas that are proposed for treatment as these areas do not generally represent quality nesting habitat for this species. However, if nest sites are discovered during any stage of the project, mitigation measures would be taken to protect them.

Wolverines have been observed and documented on Steens Mountain south of the Project Area, but sightings are extremely rare. There is no known habitat for wolverines occurring in the Project Area and there have been no known sightings.

The Project Area is considered to be habitat or potential habitat for Greater sage-grouse, an Oregon BLM sensitive wildlife species. Greater sage-grouse are sagebrush obligates, relying on the plant for food and cover throughout the year. The species may require an extensive home range with specific sagebrush habitat types required for mating or lekking, nesting, brood rearing, and wintering. In general sage-grouse populations usually demonstrate seasonality in the use of those habitats, with specific areas used as mating/lekking habitat, nesting habitat, brood-rearing habitat and wintering habitat. Sage-grouse generally strut in open areas near sagebrush communities. There is only one lek site known to occur within the Project Area. The Comegys Lake #1 lek site is located on the eastern portion of the Project Area. This lek site was discovered in 1987 and 16 males were observed. There are several other leks that occur within 5 miles of the Project Area.

Sage-grouse generally use big sagebrush for nesting habitat, although some have been known to nest in low sagebrush and other habitats. Areas that are rich in forbs are important in the brood-rearing stage and prenesting period for hens. The low sagebrush flats within the Project Area could be optimal foraging areas during these stages as they generally are rich in forbs. In winter, sage-grouse congregate in areas where sagebrush is available above the snow or on windswept ridges. By late fall, sagebrush is almost exclusively the only item in the diet and remains so until spring. The mountain big sagebrush communities in the Project Area have the potential to provide quality wintering habitat as the snow depth rarely covers the plants. Approximately 40 percent of the Project Area is classified as yearlong habitat with 20 percent classified as probable habitat - context unknown. Approximately 5 percent of the Project Area is classified as unsuitable due to either natural grasslands or grassland seedings; roughly 10 percent is classified as historical habitat but currently unsuitable due to either

prescribed fire or wildfire. Areas considered unsuitable due to prescribed or wildfire may still be providing quality foraging habitat as these areas are often rich in forbs. However, this would depend on plant community response following fire and proximity of the site to sagebrush cover. The remaining 20 percent is classified as historical habitat but currently unsuitable due to juniper encroachment. These are areas where mountain big sagebrush-bunchgrass communities and low sagebrush flats have been encroached upon and outcompeted by western juniper. Today, these areas would be classified as juniper woodlands or in a mid to late transitional stage toward juniper woodlands. In addition, much of the areas that fall under the broad classifications of probable habitat - context unknown and yearlong habitat are undergoing transition to juniper woodlands as well. Areas in transition to juniper woodlands are, or will be, considered nonhabitat for sage-grouse if nothing is done to control the encroaching juniper.

Northern goshawks are known to occur in the vicinity of the Project Area, but there are no known nest sites. Goshawks are usually a forest species but will use dense, large groves of aspen with considerable canopy closure. Many of the aspen stands in the Project Area have been invaded by juniper, therefore, the amount of potential nesting habitat has probably decreased. Some aspen stands have had juniper cut out in the last 15 to 20 years, however, the density of mature aspen may not be high enough yet for nesting goshawks. Any aspen stands that are in an area to be treated will be surveyed at least 1-year prior to treatment for the presence of nest sites.

Swainson's hawk may be found in the Project Area but documentation of nest trees or sightings has not been obtained. These raptors prefer open country and have little need for numerous trees or utility poles since they forage almost exclusively while in flight and may include only the nest tree in their home range (Janes, 1985b). Therefore, the private fields just north of the Project Area are far more likely to support Swainson's hawks than the Project Area itself. However, nest sites may occur and would most likely be found in areas with little juniper encroachment, and thus would not be the target of the proposed action. If nest sites are discovered in treatment areas, mitigating measures would be taken to protect birds and nest sites.

Preble's shrew has been found in the general vicinity of the Project Area in a variety of habitats but is found mainly near streams, wet meadow and aspen habitats but also in sagebrush-bunchgrass vegetation types near these wet areas. Verts and Carraway (1998) suggest the rarity of specimens of this species may be an artifact of sampling effort. It is likely that this species exists within the Project Area.

Eight species of SSS bats are known to inhabit areas in and around the Project Area. These include the long-eared myotis, long-legged myotis, pallid bat, silver-haired bat, spotted bat, Townsend's big-eared bat, western small-footed myotis, and Yuma myotis. These bats use a variety of habitats for roosting and foraging. Roosting habitats include crevices in rock cliffs and rimrock, abandoned mines, abandoned structures and in trees with loose bark such as older cottonwood and juniper trees. Foraging habitats include open grasslands, shrub-steppe, and in and around trees. Most species will fly some distance from their day roosts to forage for bugs and drink water then will roost for a couple of hours around midnight. They will return to foraging then return to their day roosts. There is little information on bats and their foraging or roosting areas within the Project Area.

Fauna – Fish:

Great Basin redband trout (*Oncorhynchus mykiss ssp*.), a Bureau tracking species in Oregon, are found in Deep, Mahon, Riddle, and Smyth Creeks. This species prefers cold, clear, fast-flowing water with clean cobbles and gravels. These trout are adapted to the dry, hot summers of eastern Oregon and can withstand short periods of time at peak water temperatures of 24.0 to 27.0 °C (75.0 to 80.0 °F), which would be lethal to most other trout (Bowers, et al., 1979).

Malheur mottled sculpin (*Cottus bairdi*), a Bureau sensitive species in Oregon, are found in Riddle Creek. Habitat requirements are similar to redband trout as this species also prefers cool, clear, fast-flowing water with clean cobbles and gravels. In Harney Basin, Malheur mottled sculpin are most common in smaller or isolated creeks (Markle and Hill, 2000).

Other non Special Status fish likely to occur in the Project Area include speckled dace, longnose dace, bridgelip sucker, and redside shiner. Effects on these species would be the same as effects to SSS and will not be separately analyzed in this document.

5. Noxious Weeds

The Burns District weed database currently identifies approximately 48 sites of noxious weeds totaling 299 acres in the Project Area (Table 3.0). The weed database does not contain an accurate inventory of the medusahead rye infestations in the area. Except for medusahead, the majority of noxious weed sites occur along roads or around reservoirs and have been/are being actively treated on a regular basis. The treatments utilized include chemical, mechanical, and biological control methods.

Currently, Oregon BLM is under a court-ordered weed control herbicide injunction which limits the use of herbicides on Oregon BLM-administered lands to four active ingredients (dicamba, picloram, glyphosate, and 2,4-D).

Medusahead, the most problematic weed in the Burns District, is increasing in acreage and locations. The recommended treatment for medusahead is a fall application of Plateau at 6 oz/acre, which the BLM is currently unable to use due to the injunction. Glyphosate can be used by the BLM early in the spring but will severely injure any associated desirable vegetation. Until the injunction is resolved, Burns District BLM is unable to effectively treat medusahead. Without herbicide application intervention, medusahead will continue to increase regardless of any juniper management activities that occur.

Additional spread may be slowed by adjusted timing of livestock moves through pastures containing medusahead, and limiting vehicle use in medusahead-infested areas around the time that seeds would most likely be picked up and transported.

Table 3.0. Noxious Weeds Identified Within or Adjacent to the Project Area

Weed Species	**# of Sites**	**# of Acres**
Bull Thistle	21	6.1
Canada Thistle	13	41
Medusahead Rye	10	102
Perennial Pepperweed	1	24
Scotch Thistle	1	.0007
Spotted Knapweed	1	124
Whitetop	1	1.57
Total	**48**	**299**

6. Cultural Heritage

To varying extents, upland ecosystems in the Harney Basin have played a role in hunter–gatherer economies for the last 10,000 years (Couture, 1986; Jenkins and Connolly, 1990). Surface archaeology suggests the most intensive use of the uplands in the Project Area probably occurred during a period of increased effective moisture that occurred between 4000 and 2500 years ago (Beck, 1984). This period also witnessed establishment of housepit village occupations focused on the Diamond Valley lake-marsh system that likely persisted until approximately 700 years before present (Musil, 1995). Researchers postulate that an increased use of upland settings is concurrent with a pattern of semi-sedentary village occupation elsewhere in the Great Basin and southern Columbia Plateau is based upon intensification of marsh and root crop resource harvesting (Oetting, 1989; Ames and Marshall, 1980).

During the ethnographic period (approximately 1800 to 1862), the Project Area was utilized by a band of Northern Paiute known as the Wada Tika, who wintered near the marshes of Diamond Valley (Stewart, 1941). According to ethnographer Julian Steward (1938), the territory of the Wada Tika band was bounded on the south by Steens Mountain. Many of the Harney Valley Paiute Indians left the Malheur Indian Reservation for the Steens Mountain Area in 1876 following a failure of the Federal government to provide sufficient rations and supplies.

Historic development in the vicinity of the Project Area began after 1870 when Mace McCoy and the Riddle family arrived at homesteads in Diamond and Happy Valleys. During the 1880s, the influx of homesteaders accelerated and cattle baron Pete French purchased land for a sub-headquarters in Diamond Valley. A post office was established in Diamond to serve the increasing population of the Diamond area in 1887. In the early 20th century, a decline in the cattle market and availability of immigrant Basque and Irish laborers prompted a sheep raising boom in the Steens Mountain Area. At one point during the 1920s, there were over 200,000 head of sheep on the Steens Mountain summer range (Bright, 1979).

A total of 23 cultural resource properties have been documented during the 14 cultural resource inventories conducted within the Project Area since 1979. These surveys were completed in response to habitat restoration, range improvement, and fuels reduction projects and covered approximately 5,000 acres within the Project Area. Thirteen of the documented properties are related to precontact occupations of the Project Area, five are post-contact historic properties, and five display precontact and post-contact historic elements. The National Register of Historic Places (NRHP) eligibility status of nearly all documented cultural resource properties in the Project Area remains undetermined. Three post-contacts sites were determined as not eligible for inclusion to the NRHP. For management purposes, properties with an undetermined eligibility status are afforded the same protection as eligible properties during all Federal undertakings.

The most frequently occurring type of cultural resource in the Project Area are lithic dominated archaeological sites, known as "lithic scatters." Such deposits are the archaeological signature of precontact era hunter-gatherer occupations that span several thousand years. Lithic scatters typically include obsidian, chert, and basalt artifacts and are often visible at the surface of the ground. Eighteen cultural resource properties documented in the Project Area display a precontact period component. Sites of this type range between .1 and 133 acres in size, and several display potential for patterned subsurface components.

Historic post-contact era cultural resource properties may include standing buildings and/or archaeological features such as foundations or structural ruins, privy pits, refuse dumps, and blazed trees. Sites with historic components are believed to be associated with early 20th century sheepherding and/or homesteading activities. Historic archaeological deposits typically include scatters of solder sealed tin cans, tobacco tins, bottle glass, nails, and miscellaneous fragments of tin and iron hardware greater than 50 years of age. Ten cultural resource properties identified in the Project Area display a historic period component. Post-contact era cultural resource properties range between .3 and 3.7 acres in size.

Just under 55,000 acres within the Project Area are considered "High Probability" for the occurrence of cultural resources. Several cultural resource properties documented in the vicinity contain, or are adjacent to, accumulations of hazardous fuels. Prior to project implementation, a Class II cultural resource inventory[17] and coordination with the Burns Paiute Tribe would be required to comply with terms of the Protocol for Managing Cultural Resources on Lands Administered by the Bureau of Land Management in Oregon. The protocol describes how the BLM and the Oregon SHPO will cooperate under a national Programmatic Agreement to meet requirements of Section 106 of the National Historic Preservation Act.

7. American Indian Traditional Practices

The Project Area lies within the aboriginal territory of the Wada Tika Tribe of the Northern Paiute Indians (known today as the Burns Paiute Tribe). The Burns Paiute Tribe was Federally recognized in 1972. The National Environmental Policy Act (NEPA), and other authorities, requires that Federal agencies consider the impact of their actions on cultural uses of the environment such as those practiced by present-day communities of American Indians. The BLM and Burns Paiute Tribe signed a Memorandum of Understanding in 2001 that outlines a means for consultation and coordination between the BLM and the Tribe during the environmental planning process.

Resources of contemporary tribal interest may include traditional cultural properties (NPS, 1990), areas important for the practice of Indian religion, Indian sacred sites on public lands, and areas that support cultural uses of the natural environment (i.e., subsistence use of plants or animals). No specific American Indian traditional practices areas have been identified to the BLM within the Project Area; however, BLM is aware these areas exist. The BLM would be in continued consultation for management of these areas with the Tribe throughout the life of the project. The Tribe has expressed a concern regarding the population and distribution of culturally important plant species throughout the Three Rivers Resource Area during previous coordination.

[17] ***Class II Cultural Resource Inventory:*** A sample based field survey designed to characterize the density, diversity, and distribution of cultural resource properties in an area of potential effect.

Numerous streambottoms in the Project Area provide habitat suitable for hardwood shrubs of interest to the Tribe such as willow and quaking aspen. Upland areas with thin and rocky soils may support key edible species such as bitterroot or biscuitroot.

8. Areas of Critical Environmental Concern/Wild Horses and Burros

There is one ACEC located within the Project Area. The Kiger Mustang ACEC was designated in 1992 for the unique characteristics of the wild horses that inhabit the area. The ACEC is made up of the Kiger and Riddle Mountain Wild Horse HMAs totaling 66,244 acres. The Kiger HMA has an established Appropriate Management Level (AML) of 82 head and Riddle Mountain HMA has an AML of 56 head. Both HMAs are managed under the same Herd Management Area Plan.

The HMAs are monitored by census flights every 2 to 3 years. Vegetative studies are conducted yearly and population is controlled by capturing horses for adoptions approximately every 4 years.

B. Noncritical Elements

1. Soils

There are four general soil associations in the Project Area which have more than one plant community associated with them depending on depth, texture, coarse fragments, and depth of limiting layer. The Ninemile-Westbutte-Carryback soil type is the most extensive, covering about 75 percent of the area. These soils generally have a vegetation cover of low sagebrush and mountain big sagebrush and are in the 12 to 14-inch precipitation zone. These soils are shallow to moderately deep, well-drained, cobbly loams and stony clays and have moderate potential for water erosion.

The Baconcamp-Clamp-Rock Outcrop soil association covers about 10 percent of the Project Area and generally has a vegetation cover of mountain big sagebrush. Precipitation ranges from 12 to 16 inches yearly in this type. These soils are shallow to deep, well-drained loams and cobbly clay loams with moderate potential for water erosion.

The Raz-Brace Anawalt soil association covers about 10 percent of the Project Area and generally has a vegetation cover of Wyoming big sagebrush and various bunchgrasses. Precipitation ranges from 10 to 12 inches yearly. These soils are very shallow to moderately deep, well-drained stony clays with a low to moderate potential for water erosion.

The Felcher-Skedaddle soil association covers about 5 percent of the Project Area and is located generally on steeper slopes of canyons. The major vegetation type occurring on this type is Wyoming big sagebrush/bunchgrass. Precipitation ranges from 8 to 12 inches per year in this type. These soils are moderately deep, well-drained stony clays with a low potential for water erosion.

2. Vegetation

Vegetation within the Project Area is dominated by sagebrush (*Artemisia* sp.) and western juniper (*Juniperus occidentalis*). Approximately 70 percent of the Project Area is dominated by juniper containing trees established less than 130 years ago. A study conducted on Steens Mountain found 95 percent of the trees sampled established after a period during the 1870s (Miller and Rose, 1995). Trees that established prior to this point are primarily found in rocky, shallow soil areas where periodic fires would have been a rare event. Many of the older trees are greater than 250 years old and may even reach ages in excess of 1,000 years (Miller, et al., 2005).

Miller and colleagues (2005) have identified three stages of juniper encroachment into sagebrush vegetation. In the first stage, or early transition, juniper trees are present, but their density and cover is low. Juniper at this stage is not adversely affecting the associated woody and herbaceous plant species. The mid-transition stage has juniper as a co-dominant with sagebrush. During this second stage, juniper is starting to compete with the associated sagebrush vegetation. Sagebrush plants may actually begin to decline at the end of the second stage. The last stage is late transition in which juniper is the primary dominant woody plant in the community. Sagebrush has been dramatically suppressed or even eliminated from the plant community. The number of trees per acre and the canopy cover that this occurs at is dependent on site characteristics. Sites with shallow soils will reach late transitional woodlands at lower number of trees and canopy cover values than on deeper more productive soils. In some areas, where soil depth is greater than 24 inches, juniper may eliminate woody vegetation, but retain an herbaceous layer. However, on shallow soils, the herbaceous layer is also drastically reduced.

A number of woody plant species can be found across the Project Area. Low sagebrush (*Artemisia arbuscula*) and big sagebrush (*Artemisia tridentata*) are found across 92 percent of the Project Area. Other shrubs present include antelope bitterbrush (*Purshia tridentata*), mountain snowberry (*Symphorocarpus roundifolius*), wax currant (*Ribes cereum*), mountain mahogany (*Cercocarpus ledifolius*), green rabbitbrush (*Ericameria viscidiflora*), and gray rabbitbrush (*Ericameria nauseosa*). These shrubs may dominate small patches, but big sagebrush and low sagebrush dominate a majority of plant communities. Quaking aspen (*Populus tremuloides*) can be found in specialized habitats.

Herbaceous plants are dominated by perennial grasses and native perennial and annual forbs. Perennial grasses commonly found are bluebunch wheatgrass (*Pseudoroegneria spicata*), Idaho fescue (*Festuca idahoensis*), Sandberg's bluegrass (*Poa secunda*), bottlebrush squirreltail (*Elymus elymoides*), basin wildrye (*Leymus cinereus*), Thurber's needlegrass (*Achnatherum thurberianum*), and prairie Junegrass (*Koeleria macrantha*). Cheatgrass (*Bromus tectorum*) can be found across the Project Area, especially in recently-disturbed areas.

Numerous perennial and annual forbs can be found across the Project Area. Species composition is closely linked to soils and ecological site. Perennial forbs most commonly found are hawksbeard (*Crepis* sp.), *Agoseris* sp., lupine (*Lupinus* sp.), milkvetch (*Astragalus* sp.), biscuitroot (*Lomatium* sp.), and phlox (*Phlox* sp.). Numerous native and annual forbs are also present and related to site and recent climatic patterns.

Plant communities are distributed in a complex mosaic across the landscape. Patch size varies from less than 10 acres to over 1,000 acres. The most common plant community in Project Area is dominated by low sagebrush. Soils that support these plant communities are shallow, or have a restrictive layer within the upper 8 to 10 inches of the soil surface. The shallow profile restricts rooting and may allow soils to become saturated in spring. Rabbitbrush and big sagebrush may occur in small patches within these communities. Occurrence of these shrubs indicates either breaks in bedrock or deeper soil pockets. Idaho fescue, Sandberg's bluegrass, and bottlebrush squirreltail are the most common perennial grasses found in these plant communities. These grasses are shallow to moderately deep-rooted species. Low sagebrush plant communities contain a great variety of perennial and annual forbs. Perennial forbs found include hawksbeard, milkvetch, false dandelion, and balsamroot (*Balsamorhiza* sp.). These perennial forbs are deep rooted. Many shallow rooted, mat-forming species can also be found. Phlox, buckwheat (*Eriogonum* sp.), sandwort (*Arenaria* sp.), and pussytoes (*Antennaria* sp.) are the common mat-forming forbs. Small areas of low sagebrush plant communities contain old juniper trees (>250 years old). Western juniper established on these sites because of the sparse fuel and low probability of fire. However, there are larger tracts of low sagebrush plant communities that have experienced an increase in juniper over the last 120 years. These stands have increased at the expense of associated shrubs and herbaceous plants. The degree of encroachment is somewhat less than in adjacent big sagebrush plant communities.

Low sagebrush plant communities respond slowly to disturbance. Shallow soils and a limited growing season restricts the plant's ability to quickly respond following disturbance. Historically, wildfires burned through these plant communities once every 150 to 250 years (Miller and Rose, 1999).

Fires that burned through low sagebrush plant communities were probably portions of larger scale fires that burned throughout the general area. Deep-rooted herbaceous perennial plants respond quickly to burning, but the mat-forming forbs and low sagebrush do not respond very well to fire. In general, mat-forming perennial plants require more years to reach preburn levels than deeper rooted perennial forbs (Miller and Rose, 1999).

Big sagebrush plant communities are the second most common plant community. Big sagebrush occupies deeper, more productive sites than low sagebrush. Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) is the primary big sagebrush subspecies present. At lower elevations, small patches of Wyoming big sagebrush (*A. t.* ssp. *wyomingensis*) occur, but are a small component of the Project Area. Big sagebrush occupies moderate to deep soil types. A number of other shrub species may be found in association with big sagebrush. Green and gray rabbitbrush are very common. Antelope bitterbrush, snowberry, and snowbrush ceanothus (*Ceanothus velutinus*) are found in specialized areas in association with big sagebrush.

There is also a wide variety of perennial grasses and annual and perennial forbs that occupy these plant communities. Many herbaceous plant species found on low sagebrush sites may also be found on big sagebrush sites. Bluebunch wheatgrass, Thurber's needlegrass, and Columbia needlegrass (*Achnatherum nelsonii*) are perennial grasses found on deeper soil areas. Deeper rooted perennial forbs are primarily found on big sagebrush sites similar to those found on low sagebrush sites. Big sagebrush is either dominant or co-dominant with herbaceous perennial grasses and forbs. Western juniper has increased dramatically on a number of areas of big sagebrush within the Project Area. Encroachment of juniper has reduced the cover and density of big sagebrush and the associated herbaceous plants while increasing the percent of the soil surface exposed.

Big sagebrush plant communities generally respond favorably to disturbance (Miller and Rose, 1999). Generally, the predisturbance plant community condition will indicate the post-disturbance response. The Project Area has a good component of perennial grasses and forbs capable of responding to disturbance. Bates and others (2004) found one perennial plant per 10 feet^2 was adequate to produce a perennial grass and forb plant community following juniper cutting on Steens Mountain. Areas where the post-disturbance plant community does not, or will not, contain this level of perennial plants would be seeded following disturbance. Fire was the most widespread disturbance factor prior to Euro-American immigration. Fires were ignited by lightning or set by aboriginal peoples. These fires would burn at a frequency of one fire every 20 to 50 years.

This was adequate to keep the level of juniper low and restricted to rocky ridgetops and shallow soil areas (Miller and Rose, 1995). In the absence of fire, juniper has increased and dominates large portions of big sagebrush plant communities. Western juniper and big sagebrush are killed by fire, but other associated shrubs sprout following removal of aboveground portions. Snowberry and rabbitbrush sprout vigorously and bitterbrush sprouts sporadically. Snowbrush ceanothus sprouts, but also has a specialized seed that may lay dormant in the soil for long periods of time, germinating after fire scarifies the seed coat. Big sagebrush will reestablish to predisturbance cover within 20 to 50 years depending on specific site productivity.

Quaking aspen occupies a relatively small portion of the Project Area, but is an important habitat for many wildlife and specialized plant species. Quaking aspen occupies deep to very deep soils that are often in areas where snow accumulates and persists late into spring. These plant communities are very diverse, containing a large number of species. Snowberry, mountain big sagebrush, snowbrush ceanothus, Idaho fescue, and mountain brome (*Bromus marginatus*) are common plant species. Many quaking aspen stands within the Project Area have been encroached by juniper. Old, decadent quaking aspen dominate the stands. Few young trees can be found, especially where juniper occurs in high densities. The decline of quaking aspen has been observed across the western United States and has been attributed to the decrease of periodic fires and an increase of conifers.

Wildfires burned through quaking aspen stands once every 60 to 90 years. At this frequency, conifer encroachment can be reduced and a full range of age classes of quaking aspen stems can be found. Quaking aspen sprout vigorously after burning, as do all associated plants with the exception of mountain big sagebrush. Aspen suckers at densities in the tens of thousands per acre can be expected following burning. Areas adjacent to the Project Area, where juniper was cut and no burning done, had a fraction of the suckers and a dramatic increase in juniper seedlings.

Just over 2 percent of the Project Area is dominated by introduced grasses. Cheatgrass dominates the herbaceous plant community on 1,190 acres (1.6 percent) of the Project Area. Native perennial grasses and forbs are scattered throughout these areas. Big sagebrush can be found on about 660 acres of cheatgrass-dominated areas. Disturbance in these areas would result in loss of big sagebrush and dominance of cheatgrass.

Small portions of the Project Area (404 acres) have been seeded to crested wheatgrass (*Agropyron cristatum*). Big sagebrush and rabbitbrush can be found growing in association with crested wheatgrass. Disturbance in this area would most likely reduce woody plants and increase crested and introduced annuals.

There are other very small areas of mountain mahogany (*Cercocarpus ledifolius*), silver sagebrush (*Artemisia cana*), and antelope bitterbrush. Mountain mahogany occurs on rocky, shallow soils. Some of these stands are being encroached by juniper. Understory vegetation in mountain mahogany stands is limited because of the inherently low site productivity and often dense mahogany canopy. Western juniper encroachment into mountain mahogany stands limits recruitment of mahogany and forces the stand to an old age structure. Antelope bitterbrush dominates small areas within big sagebrush stands. In these bitterbrush stands big sagebrush is either co-dominant or sub-dominant to bitterbrush.

Silver sagebrush stands occur in areas where ponding occurs or where soils are saturated for an extended period of time in the spring. Silver sagebrush sprouts after top kill, the only woody sagebrush in the area to sprout following disturbance.

Previous juniper treatments in these community types near and in the Project Area have shown favorable results. In nearby Kiger Canyon on Steens Mountain, fall burning in October 2003 (high severity burn) in mountain big sagebrush communities resulted in an increase in total herbaceous cover by the second year following the fire and forb cover substantially increased. Perennial bunchgrass density was reduced; however, densities the second year following the fire appeared sufficient to recover the site without the threat of annual plant dominance. (Eastern Oregon Agricultural Research Center (EOARC), File Data). Long-term trends following juniper cutting on Steens Mountain have shown an increase in perennial forbs, perennial grasses and annual forbs over uncut juniper woodlands during a 13-year period (Bates, et al., 2005). Near Paul Creek in the Project Area, rangeland monitoring studies have shown an increase in forb diversity and a higher percent composition of later seral grass species following previous prescribed fire treatments (Burns BLM monitoring data).

3. Wildlife

Wildlife, other than migratory birds and SSS, occurring in the area include mule deer, Rocky Mountain elk, pronghorn antelope, badger, black-tailed jackrabbit, cottontails, cougar, bobcat, coyote, reptiles and amphibians, many other bird species, and a myriad of small mammal species. Only big game species will be covered in depth in this section.

Pronghorn antelope can be found at all elevations of the Project Area at different times of the year. In general, antelope migrate seasonally throughout the Project Area spending winter months at lower elevations. Antelope prefer more open habitats such as grasslands, low sagebrush, and open rolling terrain, but will use other habitats, such as big sagebrush, occasionally.

Mule deer and Rocky Mountain elk use the area yearlong. Elevations below 5,600 feet are considered deer winter range (approximately 25 percent of the Project Area); however, this varies with the snowpack each year. Deer winter range is located on the northwest portion of the Project Area. Deer are dependent on sagebrush for the main part of their winter diet. Bitterbrush also plays an important browse role in the fall and early winter transitional forage. Approximately 50 percent of the Project Area is classified as Rocky Mountain elk winter range. Approximately 300 head of elk occupy or frequently use portions of the Project Area. Winter range for both deer and elk is being degraded as juniper encroachment continues to take place. Much of the winter range does not currently support browse. These are areas where juniper have encroached upon and outcompeted key forage species and become woodlands. Where juniper is in an intermediate transitional stage toward woodlands, browse species are declining in quantity, health, vigor, and palatability. In a few other areas, browse species are healthy and plentiful. These areas offer great winter forage for both deer and elk. Overall, the Project Area has a relatively small percentage of winter range currently not being degraded by juniper encroachment. Thermal and hiding cover is plentiful. Juniper and big sagebrush are the major cover types used for hiding and thermal cover during winter months to help reduce heat loss during cold winter nights. Mountain mahogany and aspen stands also serve as hiding and thermal cover, but occur less frequently.

4. Livestock Grazing Management

The Project Area includes all or portions of the following grazing allotments: Happy Valley #5309, Riddle Mountain #5310, Riddle-Coyote #5329, Smyth-Kiger #5331, Stonehouse #6040, Burnt Flat #5604, Jenkins Burnt Flat FFR #5327, Clemens FFR #5323, and Riddle FFR #5324. Table 4.0 displays Active Permitted Use per Allotment.

The general seasons of use for each allotment are as follows (with descriptions of grazing treatments per pasture). Also included are the results of the August 12, 1997 Standards for Rangeland Health and Guidelines for Livestock Management (Standards) analysis from the most recent allotment evaluations.

<u>Happy Valley #5309</u> – Five pastures of this allotment exist within the Project Area.

Three of the northernmost pastures are on a 3-year rotation where one is rested each year and the other two are used with a graze (approximately May 1 to July 15) treatment. The two southernmost pastures are used each year with a defer (approximately July 15 to October 31) treatment. For this area of the allotment, standards are not being met. Livestock were not a causal factor for this classification. Standards for riparian/wetland areas and ecological processes are not being met due to encroaching juniper. At the time of the last allotment evaluation, guidelines for grazing management were not being conformed to.

Grazing management has since been adjusted to conform to guidelines and is currently being monitored to ensure standards continue to be achieved. The existing AMP will be adjusted accordingly within the next 5 years.

Riddle Mountain #5310 and Riddle-Coyote #5329 – Seven pastures of this allotment exist within the Project Area. Typical livestock movement on this allotment is from north to south. An AMP has been developed that incorporates both allotments into a 2-year rotation designed to allow rest on two pastures each year. The Seeding Pasture has an early treatment annually so there is usually adequate time for key plants to complete their reproductive cycle. The Riddle Pasture and the Dry Pasture are on a graze/rest system where one of the two is rested each year. From there, cattle go to Paul Creek Pasture for 2 weeks on a graze treatment. Cattle leave the pasture early enough to allow key riparian plants adequate time for sufficient regrowth in order to trap sediments, complete their reproductive cycle and aid in flood plain development. From here, Big Pasture is grazed annually with a defer treatment. A group of yearlings graze the southernmost pastures. The Dollarhide Pasture and Riddle-Coyote Allotment are used with a graze/rest system where one of the two is rested each year. Cattle are gathered from the pastures in time to allow for adequate riparian regrowth. The Sheeptrail Pasture receives a defer treatment each year. Analysis of Standards for Rangeland Health on these allotments resulted in all standards being met except Water Quality and Native, Special Status, and Locally Important Species – redband trout. Current livestock grazing management was not a causal factor for this classification. These standards were not being met due to past livestock grazing practices and encroaching juniper.

Smyth-Kiger #5331 – All pastures within this allotment exist within the Project Area. However, only seven of the pastures are BLM-managed land or non-custodial pastures and have specific grazing management assigned. Each pasture has a 3-year rotation assigned as follows: Yank Springs – graze, rest, graze; Swamp Creek – graze, defer, graze; Diamond Grade – early/graze, early/graze, rest; Wood Camp – defer, graze, defer; Ruins – defer, graze, defer; Hamilton – graze, rest, graze; and Deep Creek – graze, rest, graze. Analysis of standards resulted in four standards not being met (Watershed Function – Riparian and Wetland Areas, Ecological Processes – Riparian Areas, Water Quality and Native, Special Status, and Locally Important Species – redband trout). Livestock and wild horses were a causal factor for this classification. Livestock and wild horses tended to congregate on portions of Yank Creek and Smyth Creek. Since the evaluation was conducted, Yank Creek has been excluded from livestock and wild horse use, with the exception of two water gaps. Changes in grazing management to move toward meeting the Standards for Rangeland Health for Smyth Creek have been initiated and the allotment continues to be monitored. Currently, grazing management changes (e.g., fencing and season of use) are being analyzed in an AMP.

Stonehouse #6040 – The Riddle Pasture of Stonehouse Allotment is the only pasture included within the Project Area. The project boundary line goes through a very small portion of this pasture so that a road may be used as an existing fire line if needed during project implementation. During the 1999 assessment of Standards for Rangeland Health for this allotment, an ID Team determined that standards were not being achieved for riparian areas, water quality and SSS - redband trout. In order to move toward achieving these three standards, the Riddle Pasture was established and designed to be used as a riparian pasture. Use as a riparian pasture followed 5 years of rest after a previous prescribed fire project. The prescribed fire and an AMP were developed for this allotment to ensure further achievement of Standards for Rangeland Health.

Burnt Flat #5604 – Small portions of this allotment are included in the Project Area in order to use existing roads and topographic features as fire holding lines. However, cutting and/or burning treatments may still occur on this land. There are six pastures partially or totally within the project boundary. Four pastures do not have grazing systems assigned to them, because they are categorized as custodial by the BLM due to the large proportion of private land within them, and there are no identified resource conflicts. Grazing management assigned in an AMP for the remaining two pastures are as follows: Louie Hughes – graze treatment annually, Oriana Flat – defer treatment annually. Analysis of Standards resulted in all standards being met or not present within the allotment.

The following allotments are category "C" (custodial) allotments. These allotments are typically FFRs, meaning a small portion of the pasture is public land that is frequently fenced in with surrounding or adjacent private land.

Jenkins Burnt Flat FFR #5327 – In 2003 an ID Team visited the allotment and completed a Standards and Guides Assessment Checklist. Three standards were met and two were not present. Comments state, "Good condition native range site."

Clemens FFR #5323 – In 2002 an ID Team visited the allotment and completed a Standards and Guides Assessment Checklist. Three standards were met and two were not present. Comments state, "Good range site and area is generally in good ecological condition."

Riddle FFR #5324 – There has been no analysis of standards completed for this allotment. Analysis is scheduled for 2007.

Table 4.0. Total Active Permitted Use for each Allotment. Riddle/Coyote and Riddle FFR are the only allotments that are entirely within the Project Area. Only portions of the remaining allotments are within the Project Area.

Allotment	Active Permitted Use (AUMs)
Happy Valley #5309	2,107
Riddle Mountain #5310	3,095
Riddle-Coyote #5329	300
Smyth-Kiger #5331	2,295
Stonehouse #6040	2,000
Burnt Flat #5604	3,863
Jenkins Burnt Flat FFR #5327	280
Clemens FFR #5323	78
Riddle FFR #5324	5

5. Recreation

The primary recreation activities in the Project Area are dispersed camping and hiking. These activities are usually associated with hunting big game such as mule deer, Rocky Mountain elk, and pronghorn antelope. Wild horse viewing along the Kiger Mustang Road and Viewing Area is also an important recreation activity. Upland game bird hunting occurs occasionally. Other recreation activities are rock-hounding, photography, wildlife viewing, and driving for pleasure.

6. Visual Resource Management

The treatment areas are remote and not visible from any highway or main road.

The Three Rivers RMP classifies 64 percent (47,312 acres) of the Project Area as VRM Class IV. Management objectives for this class allow for major modifications to the existing character of the landscape. Management activities may dominate the view and be the major focus of viewer attention. The Steens Mountain CMPA/RMP designates the remaining 36 percent (26,075 acres) of the Project Area as VRM Class III. Management objectives for that class require partial retention of the existing character of the landscape. The level of change to the characteristic landscape should be moderate.

7. Social and Economic Values

Livestock and feed production industries are major contributors to the economy of Harney County. The highest individual agricultural sales revenue in Harney County is derived from cattle production, which is inextricably linked to the commodity value of public rangelands. According to information derived from Harney County the "…cattle industry is counted on to provide an average of $28,000,000 per year to the economy of the county," (www.harneycounty.com 2003). In addition, nearly half of the County taxes are derived from the ranching community.

Fire management programs on public and private lands can have a stabilizing influence on local employment and standards of living. Hunting and other types of dispersed outdoor recreation also contribute to the local economy on a seasonal basis. The undeveloped, open spaces in the County are a tourist attraction and contribute to a share of revenue for local business.

8. Fire Management

The Project Area falls within the Diamond FMU of the BIFZ. The primary fire management objective in this unit is to restore fire-adapted plant communities where juniper has increased. This can be accomplished by a variety and combination of methods. A portion of the Project Area within the CMPA has been approved for Wildland Fire Use. In this area, wildfires will be evaluated based on weather, plant community, and social factors. If no human lives are threatened, and projected fire effects are acceptable, wildfire will be managed for resource benefits.

In general, the Five Creeks Project Area has experienced a reduction in the frequency of fire. The reduced occurrence of fire can be linked to active fire suppression activities and alterations in plant community composition and structure. Following coarse scale definitions developed by Hardy, et al. (2001) and Schmidt, et al. (2002), the natural fire regimes of the major vegetative communities have been classified based on average number of years between fires (fire frequency) as well as fire severity (amount of replacement) on dominant overstory vegetation.

The five fire regime classifications commonly interpreted for fire and fuels management purposes include:

I – 0-35 year frequency and low (surface fires most common) to mixed severity (less than 75 percent of the dominant overstory vegetation replaced);

II – 0-35 year frequency and high (stand replacement) severity (greater than 75 percent of the dominant overstory vegetation replaced);

III – 35-100+ year frequency and mixed severity (less than 75 percent of the dominant overstory vegetation replaced);

IV – 35-100+ year frequency and high (stand replacement) severity (greater than 75 percent of the dominant overstory vegetation replaced);

V – 200+ year frequency and high (stand replacement) severity.

Three of these fire regimes are represented across the Project Area. Fire was a fairly rare event in low sagebrush plant communities. Fires burned through these plant communities once every 200 years. Most of the aboveground vegetation was burned in these fires. This situation represents Fire Regime V. Fire was a much more common event in the big sagebrush plant communities within the Project Area. Fires burned through these plant communities once every 15 to 35 years. All aboveground vegetation was burned within the fire perimeter of these fires, similar to the low sagebrush sites (Fire Regime II). The occurrence of fire was intermediate in the quaking aspen stands. Fires burned through these areas once every 60 to 100 years. The fires would burn less than 75 percent of the aboveground vegetation (Fire Regime III).

The Project Area was analyzed with the Fire Regime Condition Class (FRCC) software. This software analyzes the current landscape based on current vegetation, predicted past vegetation, recent fire history, and predicted past fire history. A simplified description of the FRCCs and associated potential risks is presented below.

Table 5.0. FRCCs (from Hann and Bunnell, 2001)

FRCC	DESCRIPTION	POTENTIAL RISKS
Condition Class 1	Within the natural (historical) range of variability of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances	Fire behavior, effects, and other associated disturbances are similar to those that occurred prior to fire exclusion (suppression) and other types of management that do not mimic the natural fire regime and associated vegetation and fuel characteristics. Composition and structure of vegetation and fuels are similar to the natural (historical) regime.
Condition Class 2	Moderate departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances	Risk of loss of key ecosystem components (e.g., native species, large trees, and soil) are low. Fire behavior, effects, and other associated disturbances are moderately departed (more or less severe). Composition and structure of vegetation and fuel are moderately altered. Uncharacteristic conditions range from low to moderate; risk of loss of key ecosystem components is moderate.

FRCC	DESCRIPTION	POTENTIAL RISKS
Condition Class 3	High departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances	Fire behavior, effects, and other associated disturbances are highly departed (more or less severe). Composition and structure of vegetation and fuel are highly altered. Uncharacteristic conditions range from moderate to high. Risk of loss of key ecosystem components are high.

The FRCC analysis classified the Project Area as a whole in Fire Regime III. The analysis also indicates the Project Area has moderately departed from the historic fire regime (Condition Class 2).

The big sagebrush vegetation groups were classified as Fire Regime II. Conditions in big sagebrush plant communities without juniper indicate that current conditions are moderately departed from historic conditions (Condition Class 2). However, areas where juniper have encroached were classified as highly departed (Condition Class 3). The presence of juniper has changed the fuel and vegetation structure to the point that current conditions are very different from historic. Encroachment of juniper into big sagebrush plant communities has increased aboveground fuel loads.

The analysis placed low sagebrush vegetation groups in Fire Regime V. Both groups, with and without juniper, were classified as Condition Class 2. However, the analysis indicated that the fuel structure within low sagebrush vegetation groups, where juniper has encroached, is at the upper threshold of Condition Class 2. An increase in juniper on these sites has altered fuels structure, increasing severity of fires by increasing fuel loads and continuity.

Quaking aspen plant communities were classified as Fire Regime III. Encroachment of juniper into these plant communities has changed the plant community composition, vegetation/fuel structures and increased severity of fires. Quaking aspen was assigned Condition Class 3 because of these reasons.

The FRCC analysis indicates that to restore the Project Area to an appropriate fire regime, vegetation treatments would need to alter both vegetation composition and fuel structure. If this is done, the result would be the restoration of appropriate fire effects.

Table 6.0. FRCC of Dominant Vegetation Groups in the Five Creeks Restoration Project Area

Vegetation Group	Fire Regime	Condition Class
Big Sagebrush	II	2
Big Sagebrush w/Western Juniper	II	3
Low Sagebrush	V	2
Low Sagebrush w/Western Juniper	V	2
Quaking Aspen	III	3
Project Area	III	2

9. Transportation and Roads

General access to the Project Area is via U.S. Hwy 78, State Hwy 205, and Harney County roads including Diamond Lane, Lava Beds, Happy Valley, and East Steens Roads. Local access into the majority of the Project Area is via three primary roads: the Kiger Viewing Road No. 8227-0-AO between Kiger and Smyth Creeks, Smyth Ranch Road No. 8228-0-OO between Smyth and Riddle Creeks, and Riddle Creek Road No. 8222-0-GB between Riddle and Paul Creeks. These roads all originate off Happy Valley County Road and traverse the Project Area generally northwest to southeast. The extreme southeast portion of the Project Area (south of Riddle and Coyote Creeks) is accessed from the Stonehouse Road No. 8228-AO which originates off East Steens County Road.

The BLM has no formal legal access where the Smyth Ranch and Riddle Creek Roads cross private lands. Generally, access for administrative purposes is routinely allowed by owners of these private lands. Stonehouse and Kiger Viewing Roads are legal access routes into and through the Project Area. These primary routes are maintained on a more or less frequent basis by BLM, private landowners, and grazing permittees. The routes are constructed, maintained roads, with ditches, crowns, culverts, and other drainage structures in some areas but are typically not surfaced making them difficult for travel when soils are saturated and not frozen.

Other local access into specific parts of the Project Area is available via two-track roads and trails which originate and connect to the above referenced primary roads. These roads and trails are generally not designed or constructed routes and receive little, if any, routine maintenance. None of these routes traverse wilderness or WSAs.

10. Biological Soil Crusts

BSC data specific to the northern Great Basin is lacking. Research conducted by Ponzetti and McCune in 2001 may provide insight concerning BSC communities in the Three Rivers Resource Area.

Factors influencing distribution of BSCs (Technical Reference [TR] -1730-2) include, but are not limited to the following:

Elevation - BSC cover is usually greatest at inland elevations under 3,100 feet. Lichen and moss components generally increase with elevation until vascular plant cover dominates the site. The Project Area elevation is from 4,200 to 7,000 feet. Soil crust cover is not expected to be high due to elevation, but may have higher potential where slope and soil chemistry promote BSC community formation.

Soils and Topography - Shallow soils support greater total BSC cover than deep more productive soils. As coarse soil texture increases, total BSC cover decreases. In more unstable soil types, the representation of morphological groups such as short and tall moss may be exclusively under vascular plant cover (TR-1730-2).

Percent rock cover influences total BSC crust cover as well. Embedded rocks provide armor for microbiota contained within soil interspaces. Preliminary field observations in 2002 and 2003 indicate that some of the most developed BSC communities in the District occur in these highly rocky unproductive systems. North and east slopes generally favor crust development due to the moisture and temperature requirements for optimal physiological activity. Calcareous and gypsiferous soils can support higher species richness. The soil chemistry gradient has been shown to be the "…strongest explanatory factor for the compositional difference among research sites" (Ponzetti and McCune, 2001).

Calcareous and gypsiferous soils occur in the Project Area and site-specific soil chemistry varies throughout. Potential for BSCs is site-specific.

Disturbance - The intensity of and time since disturbance can influence community composition and total cover of BSC communities. The type of disturbance is a fundamental consideration as well; compressional stress from vehicles, wild horses, livestock, and human footprints can modify BSC communities. As stated by Ponzetti and McCune in their 2001 publication, "...the compositional effects of grazing were overwhelmed by the stronger soil chemistry and climate gradients. However, grazing-related differences were clearly discernable with statistical methods that accounted for the blocked design of the study." BSCs may serve as an early warning system as they appear to be more sensitive to livestock-related effects than are vascular plants.

Effects from grazing, wild horses, recreationists, short return interval fires, and juniper expansion have occurred in the Project Area. The specific contribution of these activities to current BSC condition and cover is not discernable from other historic disturbance.

Timing of precipitation - Moisture regimes can play a large role in crust community composition. Presence or absence of fog in a desert system can influence the abundance of mosses and other microbiota under shrubs due to collection of moisture by the shrub. Fog seems to play some role in the District, the extent to which is not known.

Juniper expansion has increased interception of moisture (rain and snow) and light over large portions of the Project Area. BSC communities still may occur in the understory under these conditions. As stated above, site-specific soil chemistry is the strongest factor in determining presence or absence of BSCs.

BSCs play a role in a functioning ecosystem. TR-1730-2, states that in "... a given eco-region, ecological roles of biological soil crusts can vary widely in their importance and will depend on crust composition and biomass, as well as characteristics of the specific ecosystem being considered."

Carbon fixation, nitrogen fixation, and increased soil oxygen content (during active photosynthesis) are beneficial contributions to the ecosystem resulting from BSCs. The effect of crust communities on soil water relations is highly site dependent (TR-1730-2). Soil surface microtopography and aggregate stability are important contributions from BSCs as they increase the residence time of moisture and reduce erosional processes. The influence of BSCs on infiltration rates and hydraulic conductivity varies greatly. Generally speaking, infiltration rates increase in pinnacled crusts and decrease in flat crust microtopographies. The northern Great Basin has rolling BSC microtopography and infiltration rates are probably intermediate compared to flat or pinnacled crust systems.

Common BSCs found in the Project Area are included in the following list of genera: Byrum, Cladonia, Collema, Didymodon, Lecanora, Megaspora, Peltigera, Psora, Tortula. This is not an all inclusive list of potential genera.

Identification of BSCs at the species level is often not practical for field work. Use of some basic morphological groups simplifies the situation. Morphological groups are also useful because they are representative of the ecological function of organisms (Page 6, TR-1730-2).

Microbiota, such as BSCs, can be divided into three groups based on their physical location in relation to the soil: hypermorphic (aboveground), perimorphic (at ground), and cryptomorphic (below ground).

The morphological groups are:

1. Cyanobacteria - Perimorphic/cryptomorphic
2. Algae - Perimorphic/cryptomorphic
3. Micro-fungi - Cryptomorphic/perimorphic
4. Short moss (under 10mm) - Hypermorphic
5. Tall moss (over 10mm) - Hypermorphic
6. Liverwort - Hypermorphic
7. Crustose lichen - Perimorphic
8. Gelatinous lichen - Perimorphic
9. Squamulose lichen – Perimorphic
10. Foliose lichen - Perimorphic
11. Fruticose lichen - Perimorphic

Morphological groups 1, 4, 5, 7, 8, and 9 would likely be the dominant groups represented in the Project Area. Groups 10 and 11 may also be represented as the site-specific conditions required for their growth may exist in sufficient quantity.

CHAPTER IV: ENVIRONMENTAL CONSEQUENCES

This chapter describes possible effects, including cumulative effects, of implementing the proposed action and no action alternatives. Cumulative effects are the aggregate of incremental changes in resource conditions that would result from adding possible effects of reasonably foreseeable actions including those of the proposed action, to current conditions. For the purpose of this document, "short term" effects are those lasting 5 years or less. "Long term" refers to those effects lasting longer than 5 years.

A. No Action: Critical Elements

1. Air Quality

Fuel loading and associated high severity wildfire risks would increase with the progression of juniper encroachment in the Project Area. Occurrence of a high severity wildfire in the area during summer months could result in a large amount of low-lying smoke concentrations, as temperature inversions can concentrate smoke at low elevations. Air quality in the community of Diamond may be impaired if a wildfire occurs in this area. These smoke concentrations can have high particulate levels that can cause human health problems.

2. Water Quality, Wetlands and Riparian

Under this alternative, juniper would expand and become increasingly established in riparian areas. Continued expansion would decrease riparian vegetation diversity, and the productivity and function of riparian areas. The loss of desired riparian species (e.g., willow, sedges, and cottonwood) to juniper could lead to deterioration of stream channel integrity, bank stability, and water quality.

High water events could lead to further degradation of channel integrity and water quality.

Juniper invades riparian areas by shading out or outcompeting desired riparian species. Juniper expansion into riparian areas and stream corridors would not likely lead to immediate degradation of stream channels, water quality, and fish habitat; rather it would likely be a slow process that would compound over time.

Riparian vegetation such as sedges, rushes, grasses, and woody species such as willow, alder, aspen, red osier dogwood, and cottonwood are important for maintaining stream channel integrity, water quality, and fish habitat. The root systems of these plant species stabilize and protect streambanks from eroding during high water events. Streambanks covered with herbaceous vegetation and stands of woody species catch sediment during high water events and help maintain and restore flood plain function. Deep-rooted riparian vegetation also dissipates the energy associated with high water, thus reducing the erosive potential of high water.

Juniper stands tend to have less complex vegetative communities, less understory cover, and more bare soil, and bare inter-canopy areas exhibit high rates of erosion (Reid, et al., 1999). When riparian areas are dominated by juniper, high flow events have greater potential for erosion, leading to bank instability and subsequent channel degradation.

Riparian vegetation plays an important role in maintaining water quality. Water quality can be degraded by changes in chemical/nutrient content, temperature, turbidity, and levels of sedimentation. Juniper expansion into riparian areas can lead to degraded water quality from streambank instability, degraded channel morphology, loss of storage capacity, and reduced potential for groundwater recharge. The resulting impact can lead to increased sedimentation and changes to nutrient cycles associated with deciduous and herbaceous vegetation. Groundwater recharge affects low or late season flows and thus water temperature.

Riparian areas adjacent to units where juniper has been previously cut and left are at greater risk of stand-replacing fire. Potential effects of such an event include hydrophobic and sterile soils, loss of shade, bank instability, and increased sediment levels.

The no action alternative would maintain current condition and trend of riparian areas, unless or until an event such as high severity wildfire or flood occurs. Over time, riparian condition would trend downward with consequent negative effects to water quality and riparian zones.

3. Migratory Birds

Under the no action alternative, juniper populations would continue to encroach upon other plant communities. This would likely lead to the eventual transition of these communities becoming fully-developed juniper woodlands with reduced herbaceous understories. When juniper density and cover increase to the point that sagebrush, other shrubs, and herbaceous understories are suppressed, avian species diversity decreases (Reinkensmeyer and Miller, 2000). Mountain mahogany and aspen stands would also continue to be encroached upon and outcompeted by juniper, which would likely lead to the eventual loss of these habitat and a loss of avian species diversity. This alternative would likely favor woodland species, such as gray flycatcher, dusky flycatcher, and Oregon junco. Under this alternative, as sagebrush habitat is reduced, sagebrush-dependent species, such as Brewer's sparrow, sage sparrow, and green-tailed towee would likely decrease in abundance. Species that prefer open grasslands, like meadow larks and vesper sparrows, are also likely to decrease in abundance as a result of enacting the no action alternative. Continued encroachment into riparian areas can reduce habitat quality and quantity for riparian obligate species of migratory birds. Habitat quality in the Project Area for the species that prefer sagebrush, grassland, mountain mahogany, aspen, and riparian habitats has already been degraded by juniper encroachment and would continue to decline if juniper continues to outcompete other plant communities. Overall, the net effect of the no action alternative is likely to be a decrease in avian species diversity in the long term.

4. Special Status Species (Flora, Fauna)

Flora:

The no action alternative may not aid in the restoration and protection of historic plant communities including many Special Status plant species. Affected Special Status plant species listed in Chapter III of this document could be affected by transitioning plant communities and remain susceptible to high-intensity wildfires. Under the no action alternative, restoration of plant communities would not occur. Reestablishment of historic fire regimes, which could maintain or create habitat for Special Status plants would also not occur. In fire-adapted ecosystems, many plant species have co-evolved with, and adapted to, fire.

Other species occur in areas where fuels are naturally low and fire disturbance is not part of their normal disturbance cycle. For these, a continued change in the amount of fuels and the influence of fire are a potential threat.

In general, plants in fire-adapted ecosystems have some ability to respond to stimuli generated by fire events, both natural and prescribed. Plant species respond differently to stimuli of this type and not all response is positive for a given species or population.

Fire intensity and duration are important considerations with regard to plant response. Other considerations are specific to the type of growth habit, which may be species specific or general, with regard to a group of plants that have similar characteristics.

One of the most important differences between the proposed action and the no action alternative is the potential for increased burn severity due to a lack of juniper fuels reduction. Burn severity is a measure of the amount of fuel consumption and associated heating at and below ground surface. It is a function of the duration of the fire, and relates closely to the amount of surface fuel, litter and duff consumption, and their moisture content. Belowground effects would only become apparent in areas of high fuel accumulations.

A low severity fire would have little to no effect on most buried plant parts and often stimulates a considerable amount of sprouting. A moderate severity fire may reduce sprouting from some buds. Sprouting can still occur because some buds in deeper soil layers are still undamaged. A high severity fire can eliminate species and may lethally heat some plant parts in upper soil layers, particularly where concentrations of heavy fuels are consumed. Any resprouting that does occur on heavily burned microsites can only occur from adjacent areas or from deeply buried plant parts. Abundant vegetative regeneration can still develop from species with deep roots such as aspen.

The reduced understory cover and thickness of organic layers following fire can increase light near the soil surface which can increase post fire plant response. Warmer soil temperatures following fires can enhance the amount of response as well. Some of the biggest effects may come from changes in soil chemistry and soil organisms following burning. However, most of these responses are poorly understood.

Whether herbaceous plants recover after fire depends largely on whether or not they are exposed to lethal temperatures. Survival generally depends on depth below the surface, whether they are located in combustible material, fire intensity and duration, and the subsurface moisture of the site.

Fauna – Wildlife:

There are no known effects to Threatened or Endangered wildlife species under this alternative. The no action alternative would have effects on sage-grouse, northern goshawks, and Swainson's hawks and their habitat.

Areas of potential sage-grouse habitat, but currently not functioning as habitat due to juniper encroachment, would remain in existing conditions. As juniper encroachment progresses, areas currently offering nesting, brood rearing, and wintering habitat for sage-grouse would experience a decrease in herbaceous cover and an increase in predatory raptor perches. Eventually, these areas would also become nonfunctional as sage-grouse habitat. Under this alternative, the entire Project Area may eventually become unsuitable for sage-grouse due to continued juniper invasion.

Potential goshawk nesting habitat would continue to be encroached upon by juniper. The aspen stands in the Project Area are currently degraded by juniper encroachment and would continue to deteriorate as juniper continues to invade these communities. Eventually, juniper may totally displace all aspen communities in the Project Area leaving no preferred nesting habitat for goshawks.

Juniper would continue to encroach upon current Swainson's hawk habitat. Since Swainson's hawks prefer open country, any amount of juniper encroachment would cause habitat quality to decrease. While any current habitat is an early stage of transition to juniper woodlands, Swainson's hawks are likely to persist in the area. However, as juniper encroachment progresses and trees get thicker and larger, the area would probably become unsuitable for Swainson's hawk, or at the very least, would no longer be preferred habitat.

Preble's shrew could be affected by this alternative if juniper continues to encroach into shrew habitat areas. This encroachment would reduce shrew habitat in the long term. Small wildland fires could improve shrew habitat in the long term by reducing the juniper canopy and allowing native forbs, grasses, and shrubs to return to the site. A high intensity wildfire would reduce cover for shrews over a vast area, which may decimate shrew populations in the burn area until vegetation recovers to the point it could support Preble's shrews.

Roosting habitat for bats in cliffs, rock crevices, abandoned mines, and old growth juniper trees would not be affected by this alternative. To the extent that a small or large wildland fire would kill older form juniper, this may affect some roosting habitat for bats.

Fauna – Fish:

Juniper dominance on a site has been shown to decrease shrub and herbaceous vegetation cover (Burkhardt and Tisdale, 1969; Adams, 1975; Knapp and Soule', 1998; Bunting, et al., 1999; Miller, et al., 2000; Roberts and Jones, 2000).

With this loss, soil is more prone to increased soil crusting, decreased infiltration and increased erosion (Pierson, et al., 1994). Under the no action alternative, increased runoff and erosion from surrounding hillsides is likely to occur, causing chronic sediment delivery to stream channels. Chronic sediment delivery reduces spawning habitat and reproductive success of fish by smothering eggs or trapping newly-hatched fish in the gravels below the streambed surface. Elevated sediment also reduces available habitat for both fish and macroinvertebrates (which are an important food source for fish). Increased sedimentation reduces pool habitat, which are important for cover, over-wintering habitat, and thermal refuges during temperature extremes.

Fish habitat would also likely be affected by the loss of riparian species following juniper invasion. While these effects would not occur immediately, there would likely be a slow unraveling or degradation of habitat conditions that would be accelerated during watershed disturbances. Potential effects of degraded habitat include loss of habitat complexity, bank instability, change in groundwater storage and release, increased water temperatures, and a likely change in macroinvertebrate density and diversity. The long-term impacts of juniper-dominated riparian areas include decreased water quality and aquatic habitat condition.

Loss of desired riparian vegetation would also affect the nutrient cycle. The riparian and stream nutrient cycle is likely being altered from one dominated by deciduous and herbaceous species to one dominated by juniper leaf input. While total nutrient input may not change, the nutrient input from juniper may not be as readily available for macroinvertebrates and may cause a shift in diversity and density of macroinvertebrates. Aquatic macroinvertebrates are a major food source for fish. In addition, terrestrial invertebrates such as worms, beetles, and grasshoppers would likely be less prevalent in juniper woodland due to dryer soils and less succulent vegetation. These invertebrates can be an important food source for fish.

Selection of this alternative would maintain the current condition and trend, precluding an event such as catastrophic fire or flood. There would be no immediate effects to riparian areas, water quality, or fish habitat; however, riparian areas would be in a downward trend that would have negative effects to water quality and fish habitat. Streams that have been severely degraded take many years to recover. Potential effects of this alternative could lead to lower numbers and reduced population viability of Great Basin redband trout, Malheur mottled sculpin, and other fish species.

5. Noxious Weeds

Under the no action alternative, there would be an increased risk of noxious weed invasion, or expansion of existing populations, in the Project Area as risks of a large-scale wildland fire increase. Hazardous fuels accumulations in the completed juniper cuts would remain in place and understory plants within big sagebrush plant communities would continue to decline from juniper encroachment. Wildfires that occur in juniper woodlands less than 130 years old tend to be severe enough to kill large numbers of understory plants. These conditions are conducive to noxious weed invasion.

6. Cultural Heritage

Under the no action alternative, there would be no known effect on cultural resources identified in the Project Area as no fuels reduction, watershed enhancement, or habitat improvement activities would be implemented. However, with no implementation of fuels reduction activities, archaeological and architectural resources would continue to be in jeopardy of damage or destruction by large-scale wildfire.

7. American Indian Traditional Practices

Under the no action alternative, flora resources important for traditional use and practices of the Burns Paiute Tribe would remain in their present condition. Habitats that may be important to the continuation of Burns Paiute traditional practices in the area would remain in jeopardy of disturbance by large-scale, intense wildfire events and wildfire suppression activities.

8. Areas of Critical Environmental Concern/Wild Horses and Burros

Wild horse habitat would continue to decrease as tree densities increase. Available forage would decrease, which would cause animals to concentrate in remaining areas with available forage. Increased wild horse utilization in these areas would cause stress on the understory plant species causing them to decline. With continued forage decline, the AML for the HMAs could be reduced. A reduced population size could also impact the genetic diversity of the herd. Additional effects to wild horse habitat could occur if budgetary or operational restraints delay scheduled gathers.

This alternative would increase the likelihood of a decreased amount of forage available to all herbivores in the affected HMA. Increased growing season use and dietary preference competition between wild horses and other animal populations (elk, cows) reliant upon the same limited herbaceous forage resources could be exacerbated if the no action alternative is selected.

B. No Action: Noncritical Elements

1. Soils

Under the no action alternative, juniper would continue to expand and decrease the shrub and herbaceous understory. Bare ground beneath juniper woodland canopies would increase over time and risk of surface erosion would increase.

Soil pH in riparian areas and aspen stands would decline with an increasing juniper population. A change in soil pH would alter nutrient availability and plant composition. Plants adapted to a more basic (higher pH) soils would decline.

As juniper woodlands develop within the riparian zone, the hydric species (sedges and rushes) understory decline affecting the functioning of the riparian community. The riparian vegetation functions of sediment capture and water storage would be reduced with the increase in xeric species. As juniper plants replace species of willows and alder, the massive rooting capabilities of these species and their soil holding potential would be lost, decreasing bank stability. Water temperatures would be expected to rise with increased siltation in spawning gravels from upland and riparian soil instability.

The risk of soil damage and heavy erosion following a large-scale wildfire would increase as fuel accumulates over time. High plant mortality rates following a high intensity fire leaves soil more vulnerable to wind, water, and raindrop impact.

2. Vegetation

Under the no action alternative, there would be a continued increase of juniper cover and density in big sagebrush, low sagebrush, quaking aspen, and riparian areas. The increase in cover and density would further deplete the understory woody and herbaceous plant community. Reducing the understory vegetation would increase the amount of bare ground exposed to the forces of wind and rain. Erosion would increase on these sites. The reduction in understory vegetation would be most evident in areas that are dominated by big sagebrush and have shallow soils or a restrictive layer within 18 inches of the soil surface (Miller, et al., 2001). In these areas, juniper and understory vegetation are forced to root in the same soil volume. Juniper is a much more effective competitor for resources and its root will dominate the soil horizon. The effect will be less dramatic on deeper soils. However, in deeper soils, juniper will still eliminate associated woody plants due to their similar rooting patterns and the ability of juniper to better compete for available resources. Under these conditions shrubs will be eliminated from the plant community before herbaceous vegetation.

Herbaceous vegetation will persist for a longer period because they root in upper soil horizons. Sites with deep soils (greater than 24 inches) may develop dense juniper woodlands with canopy cover approaching 75 percent and still maintain a good herbaceous plant cover. These sites would only occur on a small percentage of the Project Area.

Under the no action alternative, an increase in juniper would also occur in the low sagebrush plant communities across the Project Area. Noticeable effects from increasing juniper in these communities would develop at a slower rate because of the lower productivity on these sites. Shrubs would be reduced, but juniper cover and density would not reach that of the big sagebrush plant communities.

In most cases, the influence of juniper is limited to areas directly below the trees. Low sagebrush sites may also contain very old trees. The low fire return interval of these sites allows juniper to establish and grow to a very old age (>500 years). The increase in juniper on these sites increases the risk of widespread, high intensity fires that may kill a large number of these old-growth trees.

Juniper would continue to increase in more productive quaking aspen and riparian areas. Juniper would reach very high densities and cover, approaching full canopy closure on some sites. A combination of intense competition for resources and heavy needle fall would reduce the understory herbaceous and woody plants to very low levels. Establishment of juniper alters the vegetation and fuel structure of these areas. A shift to coniferous vegetation from broadleaves increases the fuel continuity and changes the fuel chemical composition. Dense juniper stands would increase the likelihood of high intensity/severity fires in these areas.

Areas where juniper has been previously cut would be at risk of burning in wildfires. If this occurs, the high fuel accumulations would result in large heat pulse to the soil surface and risks volatilization of soil nutrients and alteration of soil structure. If fires do occur on these sites, the fire would produce spots of bare soil that would be open for invasion by introduced annual plants.

3. Wildlife

With no treatment, plant communities would continue to transition toward juniper woodlands with reduced herbaceous understories. Browse species (e.g., bitterbrush, big sagebrush, choke cherry), elk, and especially deer rely upon in winter would continue to decrease in quantity, vigor, and palatability.

Mountain mahogany and aspen stands would also continue to be encroached upon and outcompeted by juniper trees, which would likely lead to the eventual loss of these habitats. This would cause a decrease in habitat quality for big game species as well as several bird and small mammal species that utilize these habitats. A reduction in habitat quality may eventually reduce the capacity to support current populations of these species. Thermal and hiding cover would increase under this alternative if a stand-replacement wildfire did not occur. Habitat quantity and quality for those species that prefer dense juniper woodlands would increase.

4. Livestock Grazing Management

Upland trend photos collected over the last 30 years display a marked increase in juniper on many of the upland mountain big sagebrush communities with a corresponding decrease in shrub and herbaceous cover. As grass species decline in abundance, there is increased use by livestock on the remaining plants. As the remaining plants decrease in vigor, they make available more nutrients for tree species and the downward cycle continues. The no action alternative also leaves open the opportunity for heavy buildup of large woody fuel and the chance for intense wildfire. These intense wildfires can completely kill grass and perennial forb species that would not be killed under more moderate fuel loads, thus making the area more readily available to the introduction of invasive weeds (e.g., cheatgrass and medusahead). Livestock reductions would be more extreme after intense wildfires. With the increase in juniper, and subsequent decrease in the shrub and herbaceous components, comes an increase in competition for forage between livestock, wild horses, and wildlife (elk, deer, antelope). As this competition increases, livestock and wild horse reductions would have to be made to continue managing for rangeland health.

5. Recreation

Under the no action alternative, there are more likely to be brief disruptions to recreational activities in the vicinity of the Project Area from fire suppression and smoke during the summer and fall seasons.

Big game hunting opportunities would decrease as habitat declines from loss of species and structural diversity in rangeland plant communities.

6. Visual Resource Management

There would be no immediate effects anticipated to visual resources under the no action alternative unless a major wildfire event occurs which would drastically change the visual resources in the Project Area. Eventually, as juniper encroachment continues, visual resources would be negatively affected due to the loss of diversity of plant communities and structure on the landscape.

7. Social and Economic Values

Under this alternative, no service contracts would be granted and no supplies would be purchased from local vendors for the purpose of project implementation. Woodland harvest areas would not be made available for public use.

The value of livestock in the Project Area may eventually decline under the no action alternative as forage productivity is reduced over time. The local economy may also be affected as big game hunting opportunities in the Project Area are reduced as habitat quality deteriorates.

8. Fire Management

Under the no action alternative, plant communities would continue to move through Condition Class 2 into Condition Class 3. In Condition Class 3, the risk of large wildfire occurrence increases dramatically and negative effects to human life and the environment reaches its maximum potential.

The size of most wildfires would remain small as juniper increases because of the reduction in understory herbaceous plants and shrubs. However, under severe conditions, the potential for larger fires increases because of the increased continuity of fuels. Fires under these conditions have the potential to burn large areas and are difficult to suppress. Suppression actions under these conditions will rely primarily on indirect attack. This suppression tactic relies on line constructed at some distance from the fire and unburned fuel between the fireline and flaming front is burned out. This tactic increases the area burned. The accumulation of fuels would also require a greater mop-up effort following control of wildfire.

Areas where juniper has been previously cut would continue to present a hazard if wildfire ignites or moves into the cut area. After 3 to 5 years needles will fall off the cut trees, reducing the flashy nature of the fuels; however, boles and branches will remain for many years and continue to present risks to firefighters. The high concentration of fuel will also increase the intensity of the fire, negatively affecting the soil surface and plants directly below the fuel concentration.

9. Transportation and Roads

Under the no action alternative, there is an increased likelihood for large-scale wildfires to occur. In this event, heavy smoke concentrations could limit transportation. Severe fires could also cause massive erosion affecting roads and road maintenance.

10. Biological Soil Crusts

The description of the factors influencing distribution of BSCs (TR-1730-2) found in Chapter III of this document are utilized below as categories for the discussion of potential effects on BSCs from selection of the no action alternative. For a description of how these factors may influence BSC distribution, see the BSC section of Chapter III of this document.

Elevation - The no action alternative would allow the continued modification of vegetative communities by juniper expansion. BSCs occur in old growth and expansive juniper populations, but are not as readily evident where recent (post-1870 trees) juniper population expansion has modified the understory. This may be a function of light reduction, moisture interception or simply site-specific soil chemistry.

Soils and Topography - Shallow, less productive, and deeper, more productive, soils support BSCs. The juniper expansion issue affects these two generic soil categories differently. Juniper expansion is more rapid in deeper soils and the populations that occur are denser in productive soils, whereas shallow, less productive soils generally limit juniper expansion. These areas are generally where old growth juniper is found.

The risk of a high intensity wildfire as an effect of selecting the no action alternative could threaten remnant BSCs in dense juniper stands in deep soils. The risk of wildfire is much less an issue where soils are poor and shallow, a function of the natural lack of fuels. Since BSCs are generally more common in less productive soils with large interspaces between vascular plants, the larger percentage of BSCs in the Project Area should not be affected by large-scale fires.

Initially, there should be little effect to BSCs in poor soil areas as a result of selecting the no action alternative. Eventually, juniper populations could increase in poor soil areas to the point where fire could scorch the soil and BSCs.

Disturbance - As a fire burns through an area, some vegetation and BSCs are left unaffected. The mosaic pattern in the vascular vegetation may be partially mirrored by BSC communities. BSCs also occur in areas without vascular vegetation, so the total remaining BSC cover in a burned area should be sum of the remnant cover in the vascular vegetation mosaic and unburned interspaces or areas of naturally low fuels. Selection of the no action alternative could produce situations where large-scale, high intensity wildfire events burn entire areas without leaving a mosaic of unburned vegetation. If this occurs, natural recovery of BSCs could be slowed due to a potential reliance on recolonization from fewer unburned BSC populations

Timing of precipitation - Moisture regimes can play a large role in BSC community composition. Increased juniper cover reduces available precipitation from each rain event. Precipitation that reaches ground in a stand of juniper can be substantially less compared to sagebrush-dominated systems. Increases in moisture interception could result in a lack of BSCs in expanded juniper populations where foliar cover has increased dramatically.

BSCs play a varied role in a functioning ecosystem. In a given ecoregion, ecological roles of BSCs can vary widely in importance and will depend on crust composition and biomass, as well as characteristics of the specific ecosystem being considered (TR-1730-2).

C. Proposed Action: Critical Elements

1. Air Quality

Areas impacted the greatest from prescribed fires would be those areas down wind and down drainage from the Project Area. A wind vector analysis and review of topographic features indicated these areas are typically east, northeast and north of the Project Area. The amount of impact would be dependent on atmospheric conditions at the time of ignition. Prescribed fires are planned and implemented when atmospheric stability and wind conditions promote smoke dispersion into the atmosphere and/or transport out of the area. In addition, prescriptions are planned when diurnal wind conditions limit the amount of smoke pooling in canyons and valleys. Particulates produced during the burn would be far below standards for the pollutant established in Federal and State laws. The prescribed burn plan would minimize effects of smoke on the communities of Diamond, Burns, Hines, and Crane.

2. Water Quality, Wetlands and Riparian

The proposed action calls for both prescribed burning and mechanical treatments near or in riparian areas. Prescribed burns would be initiated when conditions are conducive to lower intensity burns, which would reduce the potential of losing desired riparian vegetation. Riparian areas with high fuel loading that have the potential to burn very hot would be pretreated by manual reduction to reduce fuel loads. Juniper in riparian areas which are not burned would be cut and burned individually to reduce potential for impacts to riparian habitat quality.

No more than 15 percent of a given watershed would be burned (actual blackened acres) within the Project Area in any given year. This would limit the amount of ground disturbance within each watershed and should further minimize effects on water quality. In the burned areas, most of the herbaceous and root sprouting shrubs would retain their live rooting systems intact and hold the soil in place.

It is typically only during the first season after the burn and before vegetation begins growing that burned sites are vulnerable to accelerated erosion from direct raindrop impact.

Reintroducing and mimicking natural processes that have been excluded from riparian zones (e.g., prescribed burns and juniper removal) should result in a positive vegetation response. Treatments in riparian plant communities, as described in the proposed action, have occurred on Steens Mountain on Mud Creek (1997), South Fork Donner und Blitzen (1999), and Kiger Creek (2001). Riparian photo point monitoring studies on these creeks have indicated an increase in hydric herbaceous and riparian deciduous woody species since treatment activities (BLM file data). Reeves, et al. (1995) stated fire can be important for maintaining complex and productive habitats.

Riparian plant species possess adaptations to fluvial disturbances that facilitate survival and reestablishment following fires, thus contributing to rapid recovery of streamside habitats (Dwire and Kauffman, 2003). Prescribed fire treatments usually result in mosaic burn patterns that include patches of unburned living vegetation following treatment. These unburned areas would reduce immediate risks of increased water turbidity and stream sedimentation by providing cover and roots that stabilize sediments and serve as sediment traps.

Reducing competition from juniper in riparian zones should facilitate recovery of deciduous woody and herbaceous riparian communities to a more historic regime. This would improve watershed stability and function by reducing bare soil and sediment inputs, stabilizing banks, increasing infiltration, and maintaining or restoring proper storage and release of groundwater important for late season flows and temperatures. Water quality would improve with enhanced watershed function where erosion is minimized, sediment inputs are minimized, channel bank stability is reinforced, infiltration rates increase, and potential for groundwater recharge is restored.

By reducing high fuel loads associated with previously cut juniper, the risk of a large-scale high severity wildland fire would be reduced. Where riparian vegetation appears to be well-adapted to low severity fires, mortality rates are highest when the litter layer and root crowns are consumed by fire (Dwire and Kauffman, 2003). High severity burned areas also experience higher rates of soil loss from erosion, increased peak flows of runoff, greater duff reduction, loss of soil nutrients, and soil heating. If organic layers are consumed and mineral soil layers are exposed, soil infiltration and water storage capacities are reduced (Robichaud, 2000). By treating fuel loads within the Project Area the risk of these effects would be reduced.

3. Migratory Birds

Effects on migratory birds would depend on the treatment and vegetation being treated. The overall net effect of the proposed action would likely be an increase in habitat and avian species diversity. Effects to migratory birds nesting and brood rearing would be minimized by broadcast burning in fall, and cutting and piling where determined necessary.

Where juniper has developed into woodlands on mountain big sagebrush-bunchgrass sites, migratory bird diversity and richness is relatively low. Use of prescribed fire and/or mechanical cutting in these areas would regenerate grasses and forbs. Herbaceous plants including sagebrush and bitterbrush would also regenerate as a result of the proposed action. As these species regenerate, bird diversity and richness would likely increase. However, these actions would have adverse impacts on species that prefer woodland habitat. Birds nesting in cavities in large juniper would be minimally affected as these large juniper trees are generally fire resistant, and would not be targeted by mechanical treatments.

In areas where communities are in an early to mid-stage of transition to woodlands, migratory bird diversity and richness is relatively high. Mid-transition woodland is a temporary habitat type as these areas eventually develop into fully-developed juniper woodlands. When juniper density and cover increase to the point that the shrub and herbaceous understory is suppressed, avian species diversity decreases (Reinkensmeyer and Miller, 2000). The proposed action includes treating up to 90 percent of areas undergoing transition to juniper woodlands. Some of these areas would be treated with prescribed fire and some mechanical treatments may be utilized. In the short term, bird species diversity would decrease where communities in early to mid-transition are burned. Initially, the burn would create more grassland habitat (thus favoring ground-nesting birds). These types of plant communities have less migratory bird species diversity than areas in early to mid-juniper woodland transition. Sagebrush recovery in burned areas would begin to occur during the life of the project. The return of sagebrush to treated burned areas would depend on elevation, size of burned area, mosaic pattern of the burn, and available seed sources in close proximity to the burned area. The proposed action should increase migratory bird species diversity in the long term because the structural diversity of habitats would increase as plant succession takes place. These early to mid-transition habitats, if left alone, would eventually become fully-developed woodlands. As communities enter into the late transition woodland stage, avian abundance, diversity and richness decline (Miller, et al., 2005). Birds nesting in cavities in large juniper would be minimally affected as these trees are fire resistant, and would not be targeted by mechanical treatments.

Migratory bird species, which utilize mountain mahogany, quaking aspen, and riparian communities, would be beneficially affected as the proposed action would protect and enhance these vegetative communities. Migratory bird diversity and richness is very high in aspen stands. Removal of juniper from these communities would increase health and vigor of the stands. Fencing of aspen stands would stimulate regeneration and recruitment of younger trees. Protection and enhancement of these communities would ensure long-term availability of aspen and mountain mahogany habitats for migratory birds.

The proposed action would remove and degrade habitat for species that prefer juniper woodlands. However, the proposed action would have both immediate and long-term benefits for species that prefer sagebrush, aspen, mountain mahogany, riparian, and grassland plant communities. The following table (Table 7.0) shows abundance indices for eight widespread species and their response to different treatments. Data was gathered by Point Reyes Bird Observatory employees within, and in close proximity to, the Project Area. Burned areas represent both wildfire and prescribed fire. Data were collected relatively quickly after mechanical treatments and burns took place. Therefore, the data presented in the table represent only short-term trends.

Table 7.0. Abundance Indices in Untreated (n=128), Manually Cut (n=30), and Burned (n=31) Point Count Stations Located within or in the Vicinity of the Project Area

Mean Abundance Index (SE)			
Species	**Untreated**	**Cut**	**Burned**
Brewer's Sparrow	1.06 (0.15)	2.55 (0.28)	1.11 (0.17)
Chipping Sparrow	2.11 (0.11)	1.23 (0.22)	1.34 (0.26)
Gray Flycatcher	1.75 (0.08)	1.18 (0.17)	1.21 (0.18)
Green-tailed Towhee	1.02 (0.12)	2.58 (0.32)	0.76 (0.14)
Vesper Sparrow	0.78 (0.08)	1.12 (0.23)	2.40 (0.26)
White-crowned Sparrow	0.20 (0.04)	1.00 (0.22)	0.05 (0.03)
Western Meadowlark	0.18 (0.05)	0.18 (0.09)	0.68 (0.21)
Oregon Junco	0.82 (0.07)	0.57 (0.13)	0.34 (0.09)

Generally speaking, species that prefer sagebrush communities (Brewer's sparrow, sage sparrow, and green-tailed towhee) benefit most from mechanical cutting treatments. In fact, these species might even be better off in the short term if their habitat is left untreated. This would be dependent on current conditions of the existing habitat and intensity and patchiness of the burn. However, these species are likely to benefit just as much from burn treatments as they are from mechanical only treatments in the long term, providing sagebrush reestablishes on site. Grassland species (e.g., western meadowlark and vesper sparrow) would benefit most from burn treatments, but should still benefit from mechanical only treatments. Species, such as the chipping sparrow, gray flycatcher, and Oregon junco, are far more abundant in untreated sites, as these species prefer woodlands. Overall, the net effect of the proposed action would increase habitat diversity across the landscape as well as increase the patchiness of the habitats, and thus, should increase avian species diversity.

4. Special Status Species (Flora, Fauna)

Flora:

There are no known Federally listed Threatened and Endangered plant species in the Project Area. There are, however, Special Status plant sites. Additional sites may be discovered prior to project implementation during botanical clearance surveys.

Juniper expansion can have negative effects on Special Status plants since juniper is often more proficient at competing for available resources. The proposed action would reduce the influence of encroached juniper and, with careful flagging and project implementation, could have positive effects on Special Status plant populations.

The proposed action would also reduce the likelihood of a large-scale, high intensity wildfire. This would likely benefit plant populations by limiting the potential for catastrophic reductions in plant population size and the resulting genetic bottleneck that could provide an insurmountable obstacle to natural recovery. General effects of fire on Special Status plants are covered in the No Action Alternative Special Status - Flora Effects section.

Known or newly-discovered populations of Special Status plant species would be monitored to provide specific information on the condition of individual populations. Habitat required for Special Status plant species would be protected in accordance with PDEs.

Fauna –Wildlife:

There would be no known effects to Threatened or Endangered wildlife species under this alternative. The proposed action would have effects on sage-grouse, northern goshawks, and Swainson's hawks and their habitat.

The proposed action is in conformance with the Greater Sage-Grouse Conservation Assessment and Strategy for Oregon. The proposed action would have beneficial effects to sage-grouse habitat where mountain big sagebrush and low sagebrush communities are in mid to late transition to juniper woodland.

These areas are currently considered to be unsuitable for sage-grouse due to juniper encroachment. The majority of mountain big sagebrush sites within the project area are in mid to late transition to juniper, which does not offer quality sage-grouse habitat. Prescribed fire and juniper cutting would remove most of the encroaching juniper from these plant communities. Mechanical treatments would immediately benefit sage-grouse and their habitat. This treatment would remove predatory raptor and raven perches while maintaining and invigorating the herbaceous understory. All habitat components for sage-grouse would be improved as a result of the mechanical treatments, especially nesting habitat in big sagebrush communities and brood rearing in low sagebrush communities. Broadcast burning in areas that are in a mid to late transitional stage to juniper woodlands would reduce juniper and shrub cover. The objective in these areas is to burn 90 to 100 percent of encroaching juniper. There would likely be no negative effects to sage-grouse under these actions as these areas are considered non-habitat. Burned areas would likely offer quality brood-rearing habitat for sage-grouse as a flush of forbs is expected after the broadcast burn treatments. Nesting and wintering habitat for sage-grouse would improve in these areas as mountain big sagebrush reestablishes following juniper treatments. Overall, the mountain big sagebrush and low sagebrush sites that are currently considered unsuitable for sage-grouse due to juniper encroachment would likely again become functional habitat as a result of the proposed action.

Some areas classified as yearlong sage-grouse habitat and/or potential sage-grouse habitat, but use uncertain, are proposed to receive prescribed fire and/or mechanical treatments. Juniper has encroached, or has begun to encroach, into these habitats. These areas are in an early to mid-transitional stage toward juniper woodlands. These areas are receiving some sage-grouse use now, but as juniper encroachment continues and develops toward woodlands, sage-grouse use will decline and these areas would eventually cease to function as habitat. This process could take in excess of 50 years depending on the current status of juniper on the site, site productivity, and other environmental conditions. The objective of the broadcast burns in these areas is to burn 40 to 60 percent of the area in a mosaic pattern. The juniper that remains in the burned and unburned areas of these sites would be targeted by cutting and jackpot burning. These actions allow for roughly half of the area in these sites to retain its understory of sagebrush and bunchgrasses, thus allowing these areas to still function as yearlong habitat. Areas that are broadcast burn would remove the sagebrush component. In the short term these areas would not function as nesting or wintering habitat, but they may benefit sage-grouse nutritionally by the flush of forbs expected to occur after burning. In the long term the burned areas would return to yearlong habitat when sagebrush reestablishes itself. The mechanical and single-tree burning treatments in the low sagebrush sites would have immediate beneficial effects for sage-grouse. Jackpot burning would maintain most of the shrub component. Once treatments are complete within the Project Area and a majority of sage-grouse habitat is restored to a functioning condition, the potential would exist for an increase in sage-grouse populations.

There would be no known effects to northern goshawks as there are no known nest sites within the Project Area. Should a nest site be discovered, mitigating measures would be taken to protect both birds and nesting habitat. The proposed action would affect potential northern goshawk habitat. The proposed action would protect and enhance aspen stands. This should improve and expand potential nesting habitat. Overall, the proposed action should make the Project Area more suitable for goshawks.

There would be no known effects to Swainson's hawk as there are no known nest sites within the Project Area. Should a nest site be discovered, mitigating measures would be taken to protect both birds and nesting habitat. The proposed action may affect potential Swainson's hawk habitat. In general, the proposed action would not target areas within the Project Area that would be considered preferred habitat for Swainson's hawk because these areas have received little to no juniper encroachment. However, a limited amount of treatment may take place in these areas. Any treatment in these areas would likely improve Swainson's hawk habitat by making it more open. In addition, the proposed action would create more habitat in areas that are in a latter transitional stage toward juniper woodlands. These post treated areas would likely become suitable and maybe even preferred habitat for Swainson's hawks. Overall, the proposed action should make the Project Area more suitable for Swainson's hawks.

Removal of juniper from riparian areas and restoration of riparian habitat would benefit Preble's shrew in the long term. While this shrew is associated with wet areas such as springs or streamside vegetation, it also uses sagebrush vegetation and aspen stands quite extensively. Initially, Preble's shrew habitat may be negatively affected in some areas through the loss of sagebrush cover but will return with the reestablishment of sagebrush. Overall, the proposed action is likely to benefit Preble's shrew habitat.

Roosting habitat for bats in cliffs, rock crevices, and abandoned mines would not be affected by this alternative. The cutting and burning of young juniper could increase foraging habitat for some species of bats that use more open areas for foraging. However, it may reduce foraging habitat for those species that forage around junipers.

Fauna – Fish:

Generally, fish species present in the Project Area are not expected to be adversely affected by disturbances to habitat resulting from prescribed burning and mechanical treatments. Species such redband trout appear to be well adapted to pulsed disturbances such as those created by fire (Rieman and Clayton, 1997).

Reestablishing more natural patterns and processes could lead to restoration of more complex, productive aquatic habitats. Treatment of juniper in riparian areas would facilitate recovery of a riparian hardwood community and restore the riparian zone to more historic conditions. With the reestablishment of this community, greater bank stability, sediment capture, stream shading, nutrient input, and water storage and release is expected. Late season release of cool groundwater is important for fish survival during low flows. Controlled burning would stimulate regeneration of some riparian species (e.g., aspen) that have become decadent due to fire exclusion, further contributing to stream shading and thermal buffering. Some treated juniper would fall into the stream channel and provide cover and habitat complexity for fish. Maintaining or improving riparian function and restoring or rejuvenating riparian vegetation would maintain or improve aquatic habitat and conditions for fish.

Temporary effects to Special Status fish species from this project are likely to be related to additional input of sediment to the stream following prescribed burn and decreased shade. Depending on several factors, such as timing of burn or storm events, the severity of erosional impacts will vary. Prescribed burns would be initiated when conditions are conducive to lower intensity burns. A low intensity burn into the riparian zone would most likely result in a patchy burn pattern and leave shade-providing riparian vegetation. A patchy burn would also minimize the chance of excessive sediment delivery to streams because sediment trapping vegetation would still remain. In the event of a higher intensity burn, expected impacts would be temporary. Many studies have reported an increase in erosion and runoff immediately following a fire (prescribed or wild) but these rates return to prefire levels within 5 years (Wright and Bailey, 1982). Once riparian herbaceous vegetation recovers and the surrounding areas revegetate, sediment would be trapped before entering the stream channel.

5. Noxious Weeds

The proposed action, including mitigations for preventing noxious weed spread, should enhance the overall health of plant communities in the Project Area. Healthy plant communities would help minimize the potential for noxious weed introduction and spread. However, medusahead can move into even vigorous, productive plant communities and eventually take over. If the injunction is lifted in the next 5 to 10 years, and the BLM implements an aggressive herbicide application program, there is a reasonable chance of curtailing medusahead infestations in the Project Area.

6. Cultural Heritage

Under the proposed action, cultural resources would not likely be affected. PDEs are in place to protect identified archaeological resources from effects of mechanical disturbance and fire-related damage. Effects of mechanical disturbance, such as erosion of site deposits, would likewise be avoided through the observation of PDEs. Implementation of prescribed burning treatments could pose some risk to built structures or other fire-sensitive cultural resources identified in the Project Area.

7. American Indian Traditional Practices

Implementation of the proposed action may increase the distribution and density of riparian vegetation stands important for the practice of Burns Paiute Tribal traditions. The proposed action would have no effect on culturally important root crops.

8. Areas of Critical Environmental Concern/Wild Horses and Burros

Forage quality and quantity would increase and provide improved and additional forage for wild horses. Creating a mosaic of unburned and burned areas would improve the forage/cover ratio and wild horse habitat.

Growing season use and dietary preference competition between wild horses, elk, and domestic cattle would still exist; however, this competition could be reduced with the anticipated increase in herbaceous forage if the proposed action is selected.

D. Proposed Action: Noncritical Elements

1. Soils

Prescribed fire treatments are not expected to have a detrimental effect on soils. Prescribed fire deployment does not result in wide-scale compaction or displacement of soil. Surface erosion could slightly accelerate on burned slopes before the first growing season after ignition of a prescribed burn. No more than 15 percent of any given watershed will be burned (actual blackened acres) within the Project Area per year. This would limit the amount of surface erosion within each watershed. The mosaic burn pattern expected from the prescribed fire treatment should provide vegetated buffer areas that would further reduce delivery of sediment to streams.

The risk of surface erosion associated with unvegetated ground in juniper woodlands would be reduced as the density and diversity of understory shrubs and grasses increases. Previous prescribed landscape level burns conducted nearby in the Mud Creek Basin on Steens Mountain have indicated increased soil stability following the prescribed burns as measured by Soil Surface Factors (SSFs) (BLM rangeland monitoring 1997, 1999).

2. Vegetation

The Project Area occupies the northern portions of a fairly continuous block of sagebrush plant communities. Reestablishment of the shrub communities would help to restore the sagebrush systems on a regional basis. This is important to animals that may utilize the habitat during only portions of the year. Effects specific to each community type are as follows:

Low Sagebrush-bunchgrass

The majority of juniper found on low sagebrush-bunchgrass sites have established over the last 110 to 130 years. Removal of these trees would help to reestablish appropriate low sagebrush plant communities. Cutting juniper would help to increase soil resources (water and nutrients) for residual grasses, forbs, and shrubs. Cutting would have the least impacts on the associated herbaceous and woody plants. The downed trees and slash would also moderate the environment for plants beneath the canopy of downed trees. Moderation of the environment would help to reduce the effects of extremely cold or hot conditions on young establishing plants and protect those plants from grazing by domestic and wild ungulates.

Areas that are treated with a jackpot burn would maintain most of the shrub cover. Burning when soils are frozen or totally saturated would help to reduce individual plant death due to high temperatures caused by the accumulation of fuels.

Broadcast burning of low sagebrush may occur on small portions of low sagebrush plant communities located within larger tracts of big sagebrush. Burning would result in conversion of small areas to perennial bunchgrass/forb dominated plant communities. Miller and Rose (1999) estimated that establishment of low sagebrush following burning may take in excess of 50 years to occur on large burned areas. Establishment would occur quicker in areas where unburned patches of low sagebrush are left.

Removal of trees less than 130 years would restore the site to its historic structure of an open woodland. Old growth trees would be left on site. These old growth trees are important for many neo-tropical migrant birds and small mammals.

Retaining at least 10 percent of the trees less than 130 years old would allow for replacement of older trees as they die. Response of understory vegetation to tree removal would be limited. Low sagebrush sites are inherently low in productivity and change occurs slowly. Burning would reduce the cover of low sagebrush and mat-forming shrubs. Return to preburn shrub cover could take more than 50 years. Burning would also reduce the cover of low-growing, mat-forming forbs. However, larger perennial bunchgrass and deeper rooted perennial forbs would fill in the cover left by the reduction of mat-forming plants. Impacts of burning would occur on a small percentage of the area because of the open nature of juniper woodlands on low sagebrush sites.

Mountain Big Sagebrush-bunchgrass

Juniper has increased considerably in mountain big sagebrush plant communities. Prescribed fire and/or cutting have proven to be effective methods to reduce the influence of juniper on this plant community. Cutting, followed by jackpot burning, has proven to be an effective method to balance plant community restoration and fire management concerns on areas where juniper has developed into closed woodland. Juniper woodlands that have progressed to the point where understory shrubs have been reduced, or eliminated, will not carry fire into the canopy of the trees. In general, only very high intensity fires that occur under severe climatic conditions will move from tree to tree in juniper woodlands. Temperature, relative humidity and wind conditions required for this to occur only happen on less than 1 percent of the days during an average fire season. The conditions never occur during the late summer or fall when broadcast burning occurs. Cut juniper trees would provide protection for establishing grasses and forbs. Bates and others (2001) found that sites with an understory vegetation cover of less than 5 percent had increased to greater than 30 percent 5 years after juniper cutting. Jackpot burning helps reduce the threat of high intensity wildfire in cut juniper woodlands. This method would burn the fine fuels, limit the ability of the fire to spread, and prevent soil sterilization from excessive heat. It is conducive to maintaining the shrub component on the site and the herbaceous plant species growing under the downed junipers. Jackpot burning would impact herbaceous plants under a high accumulation of fuels. Burning when soils are frozen or saturated would reduce the negative effects of jackpot burning. Burned patches would depend on precutting density, cover and average tree size. Winter burning of downed juniper slash was found to reduce the negative impacts of jackpot burning by 30 percent (Bates, et al., 2002). Native perennial grasses and forbs are capable of responding to removal of juniper and subsequent jackpot burning, if done when soils are frozen or saturated. If jackpot burning occurs during times when soils are dry, seeding would be required to limit establishment of undesirable plants.

Broadcast burning is an effective treatment of juniper in areas where shrubs are still present in the plant community. Burning would be done in a mosaic pattern with a goal of 40 to 60 percent of the area burned. This type of burning produces a greater amount of edge than does burning in regular shaped blocks. The burning also leaves a number of unburned islands within the burned area perimeter. Large amounts of edge and a number of interior sagebrush islands increases the overall landscape diversity and helps in reestablishment of a sagebrush dominated plant community. Miller and others (2000) state that one native grass plant per 10 $feet^2$ is sufficient for native vegetation to recover following burning and/or cutting. If the threshold of one native grass plant per 10 $feet^2$ is not reached, seeding would be required to maintain a native plant population.

Quaking Aspen

Juniper encroachment into quaking aspen stands is exacerbating the general decline of quaking aspen documented across the western United States (Wall, et al., 1999). Removing juniper would help increase the amount of soil moisture and nutrients available to residual quaking aspen and understory plants. Suckering would be encouraged by some physical damage caused by juniper falling. Trees may knock over or severely damage some standing quaking aspen. This damage would help to facilitate the suckering of quaking aspen. However, resources released by cutting juniper would also be available for small juniper that occurs in the understory. Miller and Rose (1995) found up to 1,400 western juniper seedlings per acre in the understory of quaking aspen stands on the Steens Mountain. Follow-up broadcast burning treatments would reduce the number of juniper seedlings released following cutting and increase the number of quaking aspen suckers. Fencing with woven wire following treatment would protect new quaking aspen suckers from browsing by large wild herbivores and domestic livestock. Jackpot burning following cutting would help to reduce juniper seedlings. However, seedlings outside of the burned area would not be killed by the burning and would benefit from released resources.

Riparian Areas

Riparian areas make up a small percent of the total Project Area, similar to quaking aspen plant communities, but are extremely important to wildlife and landscape diversity. Juniper woodlands may be very dense in riparian areas.

Understory shrubs are eliminated from the plant community of dense juniper woodlands, limiting the ability to utilize broadcast burning. Cutting and jackpot burning would be used in areas where dense juniper woodlands exist in the riparian areas. Burning when soils are frozen, or saturated, would help to reduce the effects to the soil and herbaceous plants. Jackpot burning would also help to reduce the intensity and severity of fire effects if riparian areas are burned in a broadcast burn. Most species that occupy riparian areas are capable of sprouting following removal of the top growth. Burning would remove old plant material from woody riparian species and help facilitate sprouting. Sprouting of willows and alders may be vigorous following burning. Cutting of juniper without burning would result in numerous juniper seedlings being released. Fencing would result in the same effects as in quaking aspen stands. Fencing would allow hardwood species to recover and grow to a point where browsing can be tolerated.

Hazardous Fuels Reduction

Treatment of previously cut juniper sites would reduce the level of biomass, or fuel, left on site. Burning during frozen or saturated soil conditions would help to reduce the negative impacts of burning in areas with high fuels accumulations. Effects would be the same as burning in quaking aspen and riparian areas during the same time of year. Areas where large fuel levels occur may require post-burning seeding to facilitate establishment of perennial plants. Machine piling may be used to concentrate the fuels. Compaction due to machine use would be limited by timing and concentrating travel paths. Working machinery on frozen soils would nearly eliminate negative soil impacts to very low levels.

3. Wildlife

Implementation of the proposed action would interrupt juniper encroachment, and cause an increase in grasses, forbs, and herbaceous browse species. In addition, existing mountain mahogany, bitterbrush, and aspen stands would be maintained and even enhanced as a result of implementing the proposed action.

The vegetation mosaic created by prescribed burning and mechanical treatments would increase diversity of habitats within the Project Area. These treatments would remove much of the encroaching juniper in these communities, thus causing a likely increase in the health, vigor, and palatability of winter forage for both deer and elk. In juniper woodlands, the proposed action is expected to increase the quantity of winter forage browse species as well. The protection and enhancement of mountain mahogany and aspen stands would also benefit many other wildlife species. There would be a short-term loss of aspen habitats for big game species while the protective fences are in place. Thermal and hiding cover would decrease as a result of the proposed action. However, there would still be sufficient thermal and hiding cover in the Project Area as some juniper would be left along ridges and scattered throughout the landscape. Mountain mahogany and aspen stands can also serve as thermal and hiding cover.

Overall, pronghorn antelope, mule deer, and Rocky Mountain elk would benefit from the various treatments, especially the cutting and burning of dense stands of juniper which would convert to grasslands for several years after treatment. The increase in grasses and forbs would be a benefit to all big game species, especially pronghorn and elk. Species utilizing more open habitats would be favored as a result of the proposed action. Species favoring juniper woodlands would be negatively impacted by the proposed action. Overall, there is likely to be an increase in wildlife species diversity as a result of implementing the proposed action.

4. Livestock Grazing Management

All management activities of the proposed action that deal with juniper removal would increase available soil moisture and release nutrients, resulting in an increased production of herbaceous species. An increase in herbaceous species would improve livestock distribution thereby reducing concentrations of livestock on any given area, and may decrease overall utilization levels. Treatment of areas encroached by juniper would improve overall rangeland condition by bringing areas back to a more historical/potential community type. Rangeland monitoring studies have indicated an increase in forb diversity and a higher percent composition of later seral grass species following previous prescribed fire treatments.

Any areas of BLM-managed land which receive a broadcast burning treatment would be rested for 1-year prior to prescribed fire and for at least two growing seasons after prescribed fire. Growing season rest may be required following jackpot burning to provide for plant recovery.

5. Recreation

Under the proposed action, there may be impacts to recreational activities. Smoke and noise generated during project implementation could disrupt recreational activities in spring or fall.

In the long term, recreational activities related to big game hunting and wildlife viewing would be enhanced as habitat function improves.

6. Visual Resource Management

Prescribed fire treatments would produce segments of the landscape where the dominant color is black for a year or longer. Juniper skeletons may remain standing and blackened for a period of 20+ years. Mechanical pretreatments in downed juniper units or adjacent to property boundaries may leave piles of woody debris visible from two-track roads for a period of 2 to 3 years.

The aesthetic character of the Project Area would improve as views and scenic diversity increase. The proposed action meets management direction outlined in the Three Rivers RMP and the Steens Mountain CMPA/RMP for VRM Classes III and IV.

7. Social and Economic Values

The proposed action would utilize service contracts to prepare juniper woodlands for broadcast burning and to perform juniper cutting. Purchase of supplies and equipment necessary for implementation of the proposed action from community merchants would constitute an additional economic effect.

Designated wood harvest areas in the Project Area would allow the public to utilize cut juniper for poles and firewood. This may contribute to the local economy by making available products for fencing and heating. Overall, this contribution is expected to be minimal due to limited access into all portions of the Project Area.

Increased rangeland health could increase forage production for livestock, wild horses, and wildlife thereby increasing economic opportunities and fostering more desirable recreation opportunities.

Disruption to agribusiness during prescribed burns and required rest periods would occur.

8. Fire Management

Treatment of juniper stands less than 130 years old in big sagebrush, quaking aspen, and riparian areas would help move the area toward Condition Class 1. The Project Area was classified as Condition Class 2 by the FRCC process. Areas of mountain big sagebrush and quaking aspen that have been encroached by juniper were classified as Condition Class 3. Treatment would move the area toward Condition Class 2 and ultimately Condition Class 1. Other big sagebrush and all low sagebrush plant communities were classified as Condition Class 2. Juniper cutting in the low sagebrush and prescribed burning in low and big sagebrush plant communities would help move toward Condition Class 1.

Treatment would reduce the intensity and severity of wildfires and the risk to firefighters by altering the continuity of fuels. Suppression actions would be able to employ more direct attack strategies minimizing acres burned in wildfires. Firefighters may rely more on natural fuel breaks and changes in fuels. Less fireline may need to be constructed to suppress wildfires. Treatment of previously cut areas would help increase firefighter and public safety. Mop-up following wildfire would also be decreased by reduction of cut juniper.

9. Transportation and Roads

After completion of all project activities within a specific area, roads damaged by vehicles would be maintained and brought back to their previous standard. This PDE would eliminate any effects to transportation and roads once the project is completed.

10. Biological Soil Crusts

The description of factors influencing distribution of BSCs (TR-1730-2) found in Chapter III of this document are utilized below as categories for discussion of potential effects on BSCs from the proposed action. For a description of how these factors may influence BSC distribution, see the BSC section of Chapter III.

Elevation - The proposed action would reduce the continued modification of vegetative communities by juniper expansion in some portions of the Project Area. BSCs may benefit from reduced juniper population expansion and associated cover. BSC benefits may be a function of light increase or moisture increase.

Soils and Topography - Shallow less productive and deeper more productive soils support BSCs. The juniper expansion issue affects these two generic soil categories differently. Juniper expansion is more rapid and populations that occur are more dense in deeper more productive soils, whereas shallow less productive soils are generally where juniper expansion is limited, but are also the where old growth juniper tends to occur. The risk of high intensity fire occurrence as an effect of selecting the proposed action would be diminished in some areas, but may be sustained in untreated areas with dense juniper stands. The risk of large-scale natural fire is much less of an issue where soils are poor, shallow, and naturally lack fuels. Since BSCs are more common in less productive soils with large interspaces between vascular plants, the larger percentage of BSCs in the Project Area should not be affected by large-scale fires.

Disturbance - Prescribed burning in the form of broadcast, jackpot or individual tree burning could have an effect on BSCs. By removing BSC cover through burning, some areas (especially areas with a major moss/shrub component), could experience prolonged BSC recovery periods. The BSCs in areas of naturally low fuels (low sagebrush sites) would have less likelihood of experiencing fire events and would proportionately have less effects.

The intent of the proposed prescribed fire events is to create a mosaic of seral stages in the vegetation. As a fire burns through an area some vegetation is left unaffected; this concept applies to BSCs as well. The mosaic pattern in the vascular vegetation may be partially mirrored by BSC communities. BSCs also occur in areas without vegetation, so the total remaining BSC cover in a burned area should be sum of cover in the unburned vegetation and untreated interspaces or areas of naturally low fuels.

Fencing would not have any measurable effect to BSCs unless the structure concentrated wildlife or livestock in small areas resulting in localized compaction or mechanical disturbance.

Post fire reseeding or planting of native or desirable nonnative vegetation could benefit BSCs by providing more perennial plants to provide micro-site moisture soil stability. This method, in concert with post treatment rest from grazing, has recently been shown to benefit BSC recovery in moss dominated BSC communities (Hilty, et al., 2004).

The use of large track or wheeled machines to cut and pile brush and trees could cause localized compaction to the soil and BSCs.

By reducing buildup of fuels, especially from increasing numbers of juniper, the chances of a high intensity wildfire in the Five Creeks Project Area would be reduced as well as the potential for the creation of large uninterrupted burnt areas.

Timing of precipitation - Moisture regimes can play a large role in BSC community composition. Increased juniper cover reduces the available precipitation from each rain event. The amount of precipitation that reaches the ground in a stand of juniper can be substantially altered compared to sagebrush-dominated systems. This moisture interception could account for the lack of abundant BSC populations in expanded juniper populations where foliar cover has increased dramatically. The proposed action would reduce the interception of precipitation in treated areas.

E. Cumulative Effects – No Action Alternative: Critical Elements

The effects of the transition of mountain big sagebrush/bunchgrass, riparian, aspen, and low sagebrush/bunchgrass communities to juniper woodlands on multiple resources would be cumulative with the effects of juniper woodland development on other landscapes. Accumulations of hazardous fuels in the Project Area, in combination with other hazardous fuels on adjacent BLM-administered and private lands, would increasingly threaten resource values, private property values, and human safety.

For the purpose of this EA, the effects of past, present, and reasonably foreseeable future actions were analyzed at two scales. The first scale is defined as the proposed Project Area boundary. The second scale is at watershed level (5th field HUC) and is defined as watersheds that intersect the proposed Project Boundary within the Burns District BLM (hereby called "Watershed Area") (Map F, Cumulative Effects – Future Actions). The Project Area intersects four watersheds (Upper South Fork Malheur River, Summit Creek, Kiger Creek, and Riddle Creek) and is approximately 14 percent of the Watershed Area.

Past Actions, Project Area:

Within the Project Area, approximately 3,428 acres of juniper cutting projects have been implemented. Cutting units were primarily focused on aspen and mountain big sagebrush communities. Approximately 10,381 acres in the Project Area have been included in prescribed burn treatments over the past 10 years. These prescribed burns were conducted at a landscape level creating a mosaic of burned and unburned communities. The actual amount of burned acres is roughly 50 percent of the project acres (approximately 5,000 acres). These treatments also focused on mountain big sagebrush and aspen communities. Wildfires have occurred on roughly 5,294 acres within the Project Area. Wildfire acres are recorded as all acres contained within the outer perimeter of the fire. This method includes both burned and unburned areas. Generally, actual blackened acres can vary from 25 to 90 percent of the area. This method upwardly skews the number of burned acres and should only be used as a rough estimate as to what actually occurred on the ground.

The following tables (8.0-9.0) display prescribed fire and wildfire acres by year within the Project Area. Some fires may have overlapped prior burn areas; this overlap acreage has not been adjusted.

Table 8.0. Prescribed Fire Activities within the Project Area

Prescribed Fire Acres	
Year	Acres
1998	2,877
1999	7,504
Total	**10,381**

Table 9.0. Wildfire Acres within the Project Area

Wildfire Acres	
Year	Acres
1981	1,106
1996	3,380
1999	706
2000	102
Total	**5,294**

Past Actions: Watershed Area

Within the Watershed Area, there have been 6,880 acres of juniper cutting projects and 25,192 acres of prescribed burns (Map G, Cumulative Effects – Past Actions). Again, the prescribed burns were conducted at a landscape level, creating a mosaic of burned and unburned communities. The actual amount of burned acres is roughly 50 percent of the project acres (approximately 12,600 acres). Wildfires have been recorded across 67,668 acres. As described earlier, these acres should only be used as a rough estimate of actual acres burned in the wildfire.

Tables 10.0-11.0 display prescribed fire and wildfire acres by year within the Watershed Area. Some fires may have overlapped prior burn areas; this overlap acreage has not been adjusted.

Table 10.0. Prescribed Fire Activities within the Watershed Area (acres in Project Area are included)

Prescribed Fire Acres	
Year	Acres
1980	1,436
1996	1,493
1998	2,912
1999	7,576
2001	7,843
2002	3,932
Total	**25,192**

Table 11.0. Wildfire Acres within the Watershed Area (acres in Project Area are included)

Wildfire Acres	
Year	Acres
1980	640
1981	13,138
1982	1,961
1984	576
1985	17,430
1987	340
1996	5,726
1997	1,139
1998	1,023
1999	5,250
2000	2,021
2001	9,975
2002	322
2006	8,127
Total	**67,668**

Present Actions: Project Area

There are no ongoing juniper or prescribed fire projects within the Project Area. Currently, other authorized actions within the Project Area include livestock and wild horse grazing.

Present Actions: Watershed Area

Ongoing projects that combine juniper cutting and prescribed fire are being implemented on a limited scale within the Watershed Area. Ongoing projects include the Ruby Springs Fuels Reductions and the East Ridge Prescribed Fire Project. Both of these projects are within the North Steens Ecosystem Restoration proposed boundary (see below, Reasonably Foreseeable Future Actions: Watershed Area).

Other authorized actions within the Watershed Area include livestock and wild horse grazing.

Reasonably Foreseeable Future Actions: Project Area

There are no additional fuels reduction or vegetation treatments planned within the Project Area. Other authorized actions within the Project Area include livestock and wild horse grazing.

Reasonably Foreseeable Future Actions: Watershed Area

The North Steens Ecosystem Restoration Project is a multi-year landscape level juniper treatment that is partially adjacent to the Five Creeks Rangeland Restoration Project Area (Map F: Cumulative Effects – Future Actions). The proposed objectives and methods of the North Steens Project are the same as the Five Creeks Rangeland Restoration Proposed Action; however, the North Steens Project includes both Wilderness and WSAs. Approximately 13 percent of the Watershed Area is within the proposed North Steens Project Area.

Other authorized actions within the Watershed Area include livestock and wild horse grazing.

Specific cumulative effects of the no action alternative are as follows:

1. Air Quality

   Continued expansion of juniper across the landscape and the continued suppression of wildfires would increase the likelihood of large, high intensity wildfires across the Project Area. Similar situations could occur on adjacent lands and increase the likelihood of fires spreading to the Project Area. Wildfires would burn for longer periods and produce more smoke than average historic levels.

2. Water Quality, Riparian and Wetlands

Under this alternative, the succession of desired riparian communities to juniper woodlands would continue in riparian areas. The effects to riparian areas dominated by juniper are discussed earlier in Chapter IV. These effects would likely be compounded with grazing from wild horses, wild ungulates, and livestock. As banks become less stable from loss of riparian vegetation they would become more susceptible to effects from grazing. Effects of the no action alternative at the watershed scale would be the same as the effects at the Project Area level, but would occur over a larger area.

3. Migratory Birds

Juniper encroachment into other plant communities has occurred throughout the Upper South Fork Malheur River, Summit Creek, Kiger Creek, and Riddle Creek watersheds. Cumulative effects on migratory birds from taking no action would be loss of grassland, sagebrush, aspen, and riparian habitats and a subsequent decrease in species dependent on those habitats. This would continue indefinitely. Aspen and sagebrush would only be available at higher elevations above the juniper. As juniper expands into lower elevations, most other habitats would be lost. This would favor woodland species in the long term over other suites of species. Activities outside the Project Area, including fire, would be the only forces reducing juniper within these watersheds.

4. Special Status Species (Flora, Fauna)

Flora:

Selecting the no action alternative would increase the risk of high intensity, long duration wildfire occurrences. Wildfires of this nature pose the greatest threat to Special Status Plant species. Special Status Plant species in the affected watersheds, however, are generally located at elevations higher than where juniper expansion and fires are an issue of concern.

Fauna – Wildlife:

No action cumulative effects on SSS in the Project Area would be the same as the no action cumulative effects on migratory birds mentioned above. Juniper encroachment upon important plant communities that sage-grouse, goshawks, and Swainson's hawks inhabit has occurred throughout the Watershed Area. Sage-grouse and Swainson's hawk distribution is likely to decrease throughout these watersheds as juniper continues to encroach upon sagebrush communities. These species may also decrease in abundance as a result of the continued expansion of juniper into these communities throughout the Great Basin Region. Northern goshawks distribution would also decrease throughout these watersheds as juniper continues to encroach upon and outcompete aspen communities.

Northern goshawks may also decrease in abundance as a result of juniper expansion, but it is unlikely as goshawks generally prefer forested areas.

While Preble's shrew habitat would be reduced in the Project Area, other past treatments, naturally-ignited wildland fires and proposed treatments outside of the Project Area would restore some shrew habitat.

Roosting habitat for bats in cliffs, rock crevices, abandoned mines, old growth juniper trees would not be affected by this alternative. Foraging habitat for some of these bat species may be reduced as a result of widespread juniper encroachment.

Fauna – Fish:

Under this alternative, the succession of desired plant communities to juniper woodlands in riparian and upland areas would continue. The effects of communities dominated by juniper are discussed earlier in Chapter IV. With the selection of the no action alternative, chronic sedimentation of streams due to juniper woodland conversion within the Project Area would continue. Wildfires and other projects outside of the Project Area would be the only mechanisms operating to reduce the level of juniper encroachment. The effects of ongoing juniper encroachment would likely be compounded with grazing from wild horses, wild ungulates, and livestock. A continued decline in stream habitat conditions may cause a downward trend in redband trout and/or Malheur mottled sculpin populations. As the downward trend in habitat quality continues, restoration cost increases and its feasibility declines.

5. Noxious Weeds

Juniper expansion and wildfire events would continue to create expanses of modified habitat susceptible to invasion by noxious weeds. Survey and treatment would be difficult to perform and noxious weeds could continue to spread. The application of approved noxious weed control methods including mechanical, biological, and chemical treatments on new and existing sites would continue to utilize an integrated weed management approach.

6. Cultural Heritage

Potential cumulative effects to cultural resources under the no action alternative could include the continued and accelerated damage to cultural site constituents during wildfires, further exposure of site constituents post wildfires, fire suppression activities, sub-surface site alteration from juniper expansion, and increased bare ground on site areas which may increase the illegal collection of cultural artifacts.

7. American Indian Traditional Practices

The cumulative effects of all past, present, and future vegetation affecting events could incrementally affect the overall economic floral species health and landscape vital to American Indian traditional practices.

8. Areas of Critical Environmental Concern/Wild Horses and Burros

Wild horse habitat would decrease as tree densities increase. Available forage and foraging areas would decrease, which could cause animals to concentrate in remaining areas with available forage. Increased wild horse utilization would stress understory plant species causing them to decline. Competition for available forage would increase between elk, wild horses, and domestic cattle. Increased pressure on riparian areas would also reduce aquatic habitat, causing a potential downward trend in fish populations and water quality. With continued forage decline, AMLs for the affected HMAs could be reduced. A reduced population size could adversely affect genetic diversity.

F. Cumulative Effects - No Action Alternative: Noncritical Elements

1. Soils

As juniper cover increases throughout the Project Area and Watershed Area, the amount of bare ground beneath the woodland canopy would also increase, resulting in increased erosion rates. As erosion continues, a subsequent decline in native plant community health would occur. The effects of increased bare ground due to continued juniper invasion would be cumulative with future wildfire events. Following intense wildfire there would be an increased susceptibility to severe surface erosion.

2. Vegetation

Under the no action alternative, the succession toward juniper woodlands would continue throughout the Project Area and Watershed Area. The complexity of plant community structure and plant species composition would be reduced from that of historical plant communities. These plant communities would undergo a reduction in sagebrush cover, an eventual loss of the herbaceous understory, and overall, a loss of species diversity. The diversity of plant communities at a landscape level would continue to decline with no treatment of juniper.

3. Wildlife

The cumulative effects of the no action alternative across the Watershed Area would be the same as the effects of the no action alternative discussed in Section B of this chapter, but amplified across this broader scale. Forage for big game species would likely decrease in quantity and quality as juniper continues to encroach upon and outcompete these plant communities. Thermal and hiding cover for deer and elk would likely increase in the areas that are receiving no treatments. Habitat quality for species that favor woodlands would be improved, while habitat quality for species that favor grasslands, sagebrush, aspen, mountain mahogany, and/or riparian plant communities would likely be reduced in areas that do not receive treatment.

In 2006 wildfires burned approximately 20 percent of deer winter range and approximately 50 percent of elk winter range in the adjacent watershed to the southwest. These wildfires may result in an increase in deer dependence on the project areas current winter range. The increase in use of the project area by wintering deer would likely be minimal due to the wildfires distance from the project area and the severity of the wildfires. The wildfires occurred approximately 15 to 20 air miles from the project area, in which most of the area between the fires and the project area are suitable deer winter range. The wildfires also burned in a mosaic pattern with mixed severity leaving some winter browse species left unharmed or possibly even enhanced by the fire. If there is an increase in wintering deer dependence on the project area as a result of the 2006 wildfires it is expected to be short term and subside with the reestablishment of browse species in the burned areas. Rocky Mountain elk reliance on the project area during winter would likely be unaffected or reduced as a result of the 2006 wildfires. This is due to the fact that these animals are grazers and prefer grasses, which should revegetate the burned areas quickly.

4. Livestock Grazing Management

With no treatment, livestock grazing management would grow more difficult in that desirable herbaceous species would continue to decline as plant communities transition to juniper woodland. Livestock distribution would be limited by the lack of available forage resulting in patchy utilization patterns. Competition between livestock, wild horses, and certain wildlife species for forage demands would increase and reductions in both livestock and wild horse numbers would have to be made. Grazing would potentially increase on private lands. These lands are often in valley bottoms and near perennial water sources. The increase in use may have detrimental effects on these lands.

5. Recreation

Reduction of big game habitat would diminish recreation hunting opportunities. The potential of high intensity wildfires would continue, possibly reducing or displacing recreation opportunities and affecting visitor safety.

6. Visual Resource Management

As diverse plant communities transition into juniper woodlands, visual resources would be negatively affected. This transition would attract attention and dominate the characteristic landscape. The potential of high intensity wildfires would also continue under this alternative. In the event of a high intensity wildfire, visual resources would be drastically altered. This change in visual resources would demand attention, would not be overlooked, and would be dominant in the landscape.

7. Social and Economic Values

Due to population increases in Oregon, as well as publicity the Steens Mountain Area is receiving, tourism and visitation to the area is likely to continue to increase in the reasonably foreseeable future. Economic activities conducted on lands within and adjacent to the Project Area, as well as economic conditions throughout the County, would produce cumulative effects on social and economic values. Variables in Countywide social and economic values and activities make it difficult to quantify reasonably foreseeable social and economic factors.

With no treatment, effects of reduced rangeland health and forage production could affect agricultural production in the region and either put additional pressure on private lands or lead to a reduction in overall production, thus affecting the economy. Hunting and other recreational opportunities would also likely be diminished from declining ecosystem functionality, although it is not clear as to the extent of diminished opportunities.

8. Fire Management

Without treatment of the juniper woodlands, the continuity of fuels across the northern end of the Steens Mountain would continue to increase. Fires would have potential to spread over large areas. An increase in juniper would reduce understory vegetation and keep the sizes of most fires small. However, fires that burn under severe conditions would have potential to burn large areas with high intensity. Large fires burn for days to weeks. Large volumes of smoke are produced from these fires that may have negative effects (e.g., visibility, air quality) downwind, both locally and regionally.

9. Transportation and Roads

No cumulative effects are expected.

10. Biological Soil Crusts

Effects to BSCs could include those from alterations of historical fuel loads in the Project Area and adjacent areas. Increased fuel loading can provide conditions leading to high intensity fire events (resulting in loss of BSCs over large continuous areas). The loss of a mosaic of unburned BSCs could result in an extended recovery time at that site. Even after early recovery, BSCs in large uninterrupted burnt areas could be susceptible to disturbance from wind (dust) or water events.

The description of factors influencing distribution of BSCs (TR-1730-2) found in Chapter III of this document are utilized below as categories for discussion of potential cumulative effects on BSCs from selection of the no action alternative. For a description of how these factors may influence BSC distribution, see the BSC section of Chapter III of this document.

Elevation – Selecting the no action alternative would allow continued modification of vegetative communities by juniper expansion. The focus of this modification would be in the juniper belt that occurs primarily from 4,500 to 6,500 feet in elevation area. BSC cover in this elevation range could decrease as factors such as light reduction, moisture interception are modified.

Soils and Topography - The risk of catastrophic fire would exist as an effect of selecting the no action alternative and could threaten remnant BSCs in dense juniper stands in deep soils. Fire risk is much less an issue where soils are poor, shallow and naturally lack fuel. Since BSCs are more common in less productive soils with large interspaces between vascular plants, large-scale fires should not affect the larger percentage of BSCs in the Project Area.

There should be very little effect to BSCs in poor soil areas because of selecting the no action alternative. In the future, juniper populations could increase in poor soil areas to the point at which fire could scorch the soil and BSCs.

Disturbance - Selection of the no action alternative could produce situations where large-scale, high intensity, natural fire events burn entire areas without leaving a mosaic of unburned vegetation. If this occurs, it could slow natural recovery of BSCs due to reliance on recolonization from fewer (maybe approaching zero) unburned BSC populations.

Timing of precipitation - The amount of precipitation reaching the ground in a stand of juniper can be substantially altered compared to sagebrush-dominated systems. This reduction should not be a major factor influencing presence or absence of BSCs. However, increased juniper cover could reduce precipitation penetrating the juniper canopy; this potentially could reduce the presence or absence of BSCs site specifically.

G. Cumulative Effects – Proposed Action: Critical Elements

The effects of juniper removal and prescribed burning described in the proposed action could be considered cumulative with the effects of previous and reasonably foreseeable vegetation management projects implemented in Project Area and Watershed Area, as well as other authorized actions, such as livestock, wild ungulate, and wild horse grazing.

The proposed action, in concert with other juniper control efforts within the affected watersheds, would reduce the influence of juniper on shrubland communities across the Watershed Area. Reasonably foreseeable projects within the Watershed Area include 67,420 acres of the North Steens Ecosystem Restoration Project (currently in a planning phase). North Steens Project acres are approximately 13 percent of the Watershed Area. The Five Creeks Rangeland Restoration Project acres are approximately 14 percent of the Watershed Area.

It is likewise assumed that effects of prescribed fire treatments would also be cumulative with effects of previous wildfires, prescribed fires and juniper cut units documented within the Watershed Area (see Chapter IV, Section E: Cumulative Effects – No Action Alternative: Critical Elements, for discussion on the past, present, and future actions). Areas treated in the past with prescribed fire or burned in the past through naturally-ignited fire have returned or are progressing toward a sagebrush canopy that is useable by sage-grouse. Areas that were cut and not burned would not have had an effect on the sagebrush/shrub canopy. Areas where juniper was cut and then jackpot burned would have had only a minimal effect on the shrub canopy cover as those treatments maintain an intact sagebrush overstory.

Specific cumulative effects of the proposed action are as follows:

1. Air Quality

Other prescribed fire projects are, or will be planned for the Three Rivers and Andrews Resource Areas. Additional prescribed fire projects implemented by other land management agencies or private parties are also possible. Any cumulative effects (e.g., smoke concentrations) would be focused during the time of project implementation to a few days post treatment.

Generally, prescribed burning would be conducted in the late summer and fall. Smoke produced by prescribed fire would be similar to wildfire during the free burning stage of the fire, but the smoldering phases of the fire would not last as long as those of the larger fires. Reductions in juniper would also increase shrub and herbaceous vegetation. Smoke produced by fires in those post treatment stands would be less than the fully-developed woodlands.

2. Water Quality, Riparian and Wetlands

No more than 15 percent of any given watershed would be burned (actual blackened acres) within the Project Area per year. This would limit the amount of ground disturbance within each watershed and should also minimize effects to water quality. The Project Area is approximately 14 percent of the Watershed Area.

Similar projects conducted on Steens Mountain have shown favorable results. Objectives and methods used in the East Ridge Project are analogous to the Five Creeks Rangeland Restoration Proposed Action. Vegetation along Kiger Creek has responded very well with new growth of cottonwood, willow, and alder. Prior to introducing fire into Kiger Gorge there was very little, to no, young cottonwood. A similar response in woody vegetation along streams in the Five Creeks Rangeland Restoration Project Area is expected.

Livestock grazing would be managed to provide for upward trend in riparian condition which would minimize any negative cumulative effects. Areas of the project would be rested a minimum of two growing seasons following treatment. The duration of the rest cycle would be determined by rangeland monitoring. An effort would be made to time prescribed burns in HMAs with scheduled wild horse gathers thereby further reducing the level of cumulative effects. Due to landscape scale treatments, cumulative effect from wild ungulates would be minimal. Treatments would occur across a large area in order to disperse use from wild ungulates.

3. Migratory Birds

The proposed action will treat approximately 10 percent of the Watershed Area. Juniper encroachment into plant communities has occurred across approximately 31 percent of the Watershed Area. Implementation of the proposed action, in conjunction with other landscape restoration treatments in these watersheds, would restore sagebrush-bunchgrass, aspen, and riparian communities, and thus, benefit the species that utilize these habitats. Brewer's sparrow and sage sparrow habitat would be improved throughout these watersheds as a result of the landscape treatments occurring in the region.

Sagebrush recovery in burned areas would begin to occur during the life of the project. The return of sagebrush to treated burned areas would depend on the elevation, the size of the burned area, the mosaic pattern of the burn, and available seed sources in close proximity to the burned area. Areas treated with jackpot burning would maintain shrub cover.

4. Special Status Species (Flora, Fauna)

Flora:

In fire adapted ecosystems the vast majority of plant species have co-evolved with and adapted to fire regimes. Plant populations that respond favorably to fire disturbance could see increases in numbers.

The vast majority of Special Status plant species endemic to the Upper South Fork Malheur River, Summit Creek, Kiger Creek, and Riddle Creek watersheds (Watershed Area) occur at an elevation where fire disturbance and juniper expansion are not a factor. Other species occur in areas where fuels are naturally low, and fire disturbance is not part of their normal disturbance cycle. These species would be protected during project implementation (see PDE #3).

By following the PDEs and mitigation for Special Status plant species, populations may increase from ecosystem restoration efforts. The proposed treatments would not trend any SSS mentioned in this document toward listing.

Fauna – Wildlife:

Cumulative effects on Swainson's hawk and northern goshawk would be the same as those on migratory birds mentioned above. Proposed treatments should help to restore sagebrush, grassland, aspen, and riparian plant communities throughout the watersheds that intersect the Project Area, and thus, should benefit species which utilize these habitats.

Cumulative effects on sage-grouse would be very similar as those effects on migratory birds, Swainson's hawk and northern goshawks. Proposed treatments would help restore sagebrush plant communities throughout the watersheds that intersect the Project Area. In the long term the likely improvement and increase in sage-grouse habitat may increase the carrying capacity for sage-grouse in the general area. Short-term negative effects of these type of landscape projects are mitigated by PDEs.

Removal of juniper from riparian areas and the restoration of riparian habitat would result in an overall benefit to Preble's shrew habitat. While this shrew is associated with wet areas such as springs or streamside vegetation, it also uses sagebrush vegetation and aspen stands quite extensively. Initially, Preble's shrew habitat may be negatively affected in some areas through the loss of sagebrush cover. This habitat will return with the reestablishment of sagebrush. Overall, Preble's shrew habitat is likely to improve and or increase.

Roosting habitat for bats in cliffs, rock crevices, and abandoned mines should not be affected. The cutting and burning of young juniper could increase foraging habitat for some species of bats that forage in more open areas. However, it may reduce foraging habitat for those species that forage around junipers.

Fauna – Fish:

The proposed action would treat up to 22 percent of fish-bearing streams in the Watershed Area (47 miles of fish bearing streams are in the Project Area and 211 miles of fish bearing streams are in the Watershed Area). No more than 15 percent of a given watershed would be impacted by the proposed action in any given year. This would limit the amount of ground disturbance within each watershed and should, therefore, minimize effects on water quality/fish habitat.

Overall, reducing chronic sedimentation of streams caused by juniper encroachment in upland communities would improve fish habitat. Improved health, vigor, and quantity of riparian vegetation in riparian areas would also contribute to improved fish habitat in and downstream of the Project Area.

5. Noxious Weeds

Opportunities for noxious weed introduction and spread could be greater due to increased disturbance and traffic resulting from treatment activities. An increase of plant species diversity and plant community health would decrease opportunities for noxious weed invasion. Without the ability to actively treat medusahead with effective herbicides or biocontrol agents, proposed activities would make little or no difference in the level of medusahead infestation expected to occur in the Burns District.

6. Cultural Heritage

Cultural resources in the Project Area would benefit from landscape scale fuels reduction treatments as archaeological and built resources would become less likely to sustain damage from a severe wildfire event and fire suppression activities. This positive effect would be cumulative with the effects of other past, present and future actions in the resource area that would reduce the threat of catastrophic wildfire.

Immediately after prescribed fire treatments, ground visibility would increase. This may result in greater levels of illegal collecting. This potential increase would be eliminated when vegetative ground cover returns (approximately one growing season).

7. American Indian Traditional Practices

With adherence to the PDEs outlined in Chapter II, treatments would cause no measurable cumulative effects.

8. Areas of Critical Environmental Concern/Wild Horses and Burros

The proposed action would increase habitat values for wild horses within the affected watersheds. Approximately 20 percent of the HMAs in the Watershed Area will be treated with the implementation of the proposed action. Future planned activities, such as fuel treatments and wildfire managed for resource benefit could further benefit wild horse habitat.

H. Cumulative Effects – Proposed Action: Noncritical Elements

1. Soils

No more than 15 percent of any given watershed would be burned (actual blackened acres) within the Project Area per year. This would limit the amount of ground disturbance and potential erosion within each watershed. The mosaic burn pattern expected from the prescribed fire treatment should provide vegetated buffer areas that would further reduce delivery of sediment to streams.

Fire and grazing effects on wind erosion are primarily related to changes in vegetation structure and ground cover (Vermeire, et al., 2005). Livestock grazing would be managed to reduce effects to the soil resource following burning and thus reduce the level of cumulative effects. Livestock grazing would not occur for at least two growing seasons (May 1 to June 30) in pastures treated with prescribed broadcast fire. Timing for reintroduction of grazing would be determined by rangeland monitoring of the response of native plant communities. Success of perennial grass species within the Project Area would be determined by frequency of occurrence of key native species and species of the seed mix and measurement of a density of three perennial grass species per m^2. An effort would be made to time prescribed burns in HMAs in conjunction with scheduled wild horse gathers thereby further reducing the level of cumulative effects. Due to landscape scale treatments, cumulative effect from wild ungulates would be minimized. Treatments would occur across a large area in order to disperse use from wild ungulates.

Overall, treatment of juniper would reduce the amount of soil being moved offsite by erosion. This would also reduce the amount of sediment in streams and ultimately in the meadow systems at lower elevations outside of the Project Area.

2. Vegetation

Treatment under the proposed action alternative would create a mosaic of multiple successional stages. The mosaic would increase diversity across all scales and increase the resilience of the plant communities to disturbance. A mosaic of woodlands, grasslands, shrublands, quaking aspen, and riparian plant communities would exist post-treatment.

Long-term trends following previous juniper cutting projects on Steens Mountain have shown an increase in perennial forbs, perennial grasses, and annual forbs over uncut juniper woodlands during a 13-year period (Bates, et al., 2005). Near Paul Creek in the Project Area, rangeland monitoring studies have shown an increase in forb diversity and a higher percent composition of later seral grass species following previous prescribed fire treatments (Burns BLM monitoring data). Diversity in species and structure of vegetation would increase the resistance and resilience of plant communities across Steens Mountain.

Vegetation of the northern Great Basin developed with periodic disturbance. Drought, fire, insects, and disease all operated at various scales and timeframes. Fire suppression and past land management decisions have reduced the structural and species diversity of big sagebrush, quaking aspen, and riparian plant communities. The proposed action would help to reconstruct patchiness and interrupt the continuity of structure. Disturbances that occur would have a lower likelihood of moving across large landscapes because of treated areas.

3. Wildlife

Forage for big game species would likely increase in quantity and quality as landscape treatments in the area rehabilitate the communities that support forage species. Thermal and hiding cover would decrease, however, sufficient thermal and hiding cover would remain. Habitat quality would be reduced for those species that prefer woodlands, such as the gray flycatcher, dusky flycatcher, and Oregon junco. Abundance of some woodland species may also decrease. Habitat quality and quantity for species that favor grasslands, sagebrush, aspen, mountain mahogany, and/or riparian plant communities would likely increase. Abundance of some of the species that prefer these habitats may also increase.

In 2006 wildfires burned approximately 20 percent of deer winter range and approximately 50 percent of elk winter range in the adjacent watershed to the southwest. These wildfires may result in an increase in deer dependence on the project areas current winter range. Any increase in use of the project area by wintering deer would likely be minimal due to the wildfires distance from the project area and the severity of the wildfires. The wildfires occurred approximately 15 to 20 air miles from the Project Area, in which most of the area between the fires and the Project Area are suitable deer winter range. The wildfires also burned in a mosaic pattern with mixed severity leaving some winter browse species left unharmed or possibly even enhanced by the fire.

If there is an increase in wintering deer dependence on the project area as a result of the 2006 wildfires it is expected to be short term and subside with the reestablishment of browse species in the burned areas. The proposed action, along with other landscape treatments in the area, should improve deer winter range habitat allowing the landscape to tolerate an increase in deer use should one occur. Rocky Mountain elk reliance on the project area during winter would likely be unaffected or reduced as a result of the 2006 wildfires. This is due to the fact that these animals are grazers and prefer grasses, which should revegetate the burned areas quickly.

4. Livestock Grazing Management

Under the proposed action, the overall ability to provide periodic rest, change timing of grazing and control duration of grazing within the allotments would increase, thereby providing opportunities to improve grazing management and all aspects of rangeland management.

Further, widespread available forage would allow for a more uniform livestock distribution and utilization across pastures. This increase in upland forage may decrease use along riparian areas and, in turn, aid in improving water quality.

Finding adequate alternative forage for the grazing permittees involved in this project, grazing permittees involved in the North Steens Ecosystem Restoration Project, and permittees affected by the 2006 wildfires and future wildfire events could affect livestock grazing management while project implementation periods overlap (7 to 15 years). Currently, there are BLM allotments set aside specifically to provide alternative forage while projects are occurring on specific allotments. In addition, private land may be leased by the permittees to help with alternative forage demands.

5. Recreation

The proposed action would improve big game hunting, wildlife viewing, wildflower viewing, and a variety of other recreation opportunities within the Watershed Area by restoring riparian, sagebrush and aspen habitats. Visitor safety could also be improved through the reduced potential for high severity wildfires.

6. Visual Resource Management

Cumulative effects to visual resources from the proposed action would be varied. In general, the landscape would become rougher with the creation of additional openings in juniper stands and smoother with the conversion of juniper to grasses, forbs, and shrubs. Landscape elements would also be more complex with the addition of many irregular forms and lines. Overall landscape color would become more light green and yellowish with fewer dark green juniper.

7. Social and Economic Values

Due to population increases in Oregon, as well as publicity the Steens Mountain Area is receiving, it is likely tourism and visitation to the area would continue to increase in the reasonably foreseeable future. Economic activities conducted on lands within and adjacent to the Project Area, as well as economic conditions within the County, would likely produce positive effects on social and economic values. However, estimates of change would be difficult to ascertain.

Juniper treatment and increased rangeland health could increase forage production for wildlife, livestock, and wild horses. This may increase economic opportunities and foster more desirable recreation opportunities, although it is not clear to what level this would be achieved.

8. Fire Management

Proposed treatments would reduce fuel loading and continuity across the Project Area. Other past and proposed projects near the Project Area (e.g., North Steens Ecosystem Restoration) also help to reduce fuel continuity. The risk of large fires would be reduced because of the break in the fuel continuity across the northern end of Steens Mountain. Wildfire suppression costs would be reduced by the proposed action. More direct attack tactics may be employed keeping the fire sizes small. The proposed action would also increase Condition Class 1 acreage in the Project Area.

9. Transportation and Roads

The road maintenance PDE nearly eliminates cumulative effects from the proposed action on roads/transportation.

10. Biological Soil Crusts

By reducing the buildup of fuels, especially from increasing numbers of juniper, the chances of a catastrophic fire in the Project Area would be reduced as well as the potential for creation of large uninterrupted burned areas.

The description of the factors influencing distribution of BSCs (TR-1730-2) found in Chapter III of this document are utilized below as categories for the discussion of potential cumulative effects on BSCs from selection of the proposed action. For a description of how these factors may influence BSC distribution, see the BSC section of Chapter III of this document.

Elevation - The proposed action would reduce the continued modification of vegetative communities by juniper expansion in some portions of the Project Area. BSCs in the Project Area may benefit from increased light and moisture as a result of decreased interception from juniper.

Soils and Topography - Initially, there may be very little effect to BSCs in untreated areas as a result of selecting the proposed action. Eventually, juniper populations could increase in untreated areas to the point where large-scale wildfires could scorch the soil and BSCs.

Eventually, the total BSC cover may increase in the Project Area as treated areas with proper site-specific soil chemistry are restored to prejuniper expansion conditions.

Disturbance - Prescribed burning in the form of broadcast, jackpot or individual tree burning could have an initial effect on BSCs. The overall seral stage representation of BSCs should be a mosaic that mirrors to some extent the mosaic of vascular plant community seral stages.

By removing BSC cover through burning, some areas, especially areas with a major moss/shrub component, could experience prolonged BSC recovery periods. The BSCs in areas of naturally low fuels (low sagebrush sites) would have less likelihood of experiencing fire events and would proportionately have less effects. If these areas remain untreated due to priority or other limitation, effects from juniper expansion could slowly occur.

The intent of the proposed prescribed fire events is to create a mosaic of seral stages in the vegetation. As a fire burns through an area some vegetation is left unaffected; this concept applies to BSCs as well. The mosaic pattern in the vascular vegetation may be partially mirrored by the BSC communities. The BSCs also occur in areas without vegetation, so the total remaining BSC cover in a burned area should be sum of the cover in the unburned vegetation and untreated interspaces or areas of naturally low fuels.

Fencing would not have any discernible effect to BSCs unless the structure concentrated wildlife or livestock use resulting in localized compaction or mechanical disturbance. The extent of this disturbance is influenced by the site-specific potential for BSCs in the area that is to be fenced. Temporary fencing would have a lesser effect than permanent fencing.

Post wildfire reseeding or planting of native or desirable nonnative vegetation could benefit BSCs by increasing perennial plant cover and providing micro-site moisture soil stability. This method in concert with post treatment rest from grazing has recently been shown to benefit BSC crust recovery in moss-dominated BSC communities (Hilty, et al., 2004).

BSCs in the project area could potentially suffer a limited loss of cover as a result of the use of large track or wheeled machines to cut and pile trees. This loss of cover is limited in scale and would not be a reoccurring disturbance. BSCs would still be present in these site-specific disturbance areas and would continue to be a part of the functioning ecosystem.

By reducing the buildup of fuels, especially from increasing numbers of juniper, chances of a catastrophic wildfire in the Project Area would be reduced as well as the potential for the creation of large uninterrupted burned areas.

Timing of precipitation - The proposed action would reduce the interception of precipitation in treated areas. Interception may increase in untreated areas as a function of increasing juniper cover.

I. Cumulative Effects – Addendum

As the Council on Environmental Quality (CEQ), in guidance issued on June 24, 2005, points out, the "environmental analysis required under NEPA is forward-looking," and review of past actions is required only "to the extent that this review informs agency decision-making regarding the proposed action." Use of information on the effects on past action may be useful in two ways according to the CEQ guidance. One is for consideration of the proposed action's cumulative effects, and secondly as a basis for identifying the proposed action's effects.

The CEQ stated in this guidance that "[g]enerally, agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions."

This is because a description of the current state of the environment inherently includes the effects of past actions. The CEQ guidance specifies that the "CEQ regulations do not require the consideration of the individual effects of all past actions to determine the present effects of past actions." Our information on the current environmental condition is more comprehensive and more accurate for establishing a useful starting point for a cumulative effects analysis, than attempting to establish such a starting point by adding up the described effects of individual past actions to some environmental baseline condition in the past that, unlike current conditions, can no longer be verified by direct examination.

The second area in which the CEQ guidance states that information on past actions may be useful is in "illuminating or predicting the direct and indirect effects of a proposed action." The usefulness of such information is limited by the fact that it is anecdotal only, and extrapolation of data from such singular experiences is not generally accepted as a reliable predictor of effects. However, "experience with and information about past effects of individual past actions" have been found useful in "illuminating or predicting the effects" of the proposed action in the following instances: the basis for predicting the effects of the proposed action and its alternatives is based on published research and the general accumulated experience of the resource professionals in the agency with similar actions.

Minimal scoping comments on this project suggested analysis of the effects of certain individual past actions which have not been considered in this document, as they are beyond the scope of the current analysis and would not be useful for illuminating or predicting the effects of the proposed action. However, much information is known about past and present actions at the project and watershed scale level of analysis. The BLM has described data relevant to factors and events that influence this dynamic landscape. The cataloging of past actions has been assisted by research and monitoring conducted in and adjacent to the Project Area.

CHAPTER V: CONSULTATION AND COORDINATION

A. Interested Publics

Coordination occurred with 30 interested publics via a scoping letter sent on December 21, 2005. Three parties responded; Oregon Natural Desert Association (ONDA), Pamela Hardy – Dispersed Recreation Representative, Steens Mountain Advisory Council, and the Sagebrush Sea Campaign (SSC). These comments can be reviewed upon request. Comments to the EA, during the 30-day public review period, were submitted by ONDA, SSC, Oregon Department of Fish and Wildlife (ODFW), and three private landowners/permittees. Substantive comments are summarized with a response in Chapter VI of this document.

B. Agencies and Individuals Consulted

Barton Lake Ranch
Burns Paiute Tribe
Eastern Oregon Agricultural Research Station –USDA/Agricultural Research Service
Harney County Court
Harney County Soil and Water Conservation District
Harney County Watershed Council
Home Ranch LLC
Jenkins Ranches, Inc.
Oregon Department of Fish and Wildlife
Otley Brothers, Inc.
Riddle Ranches, Inc.
Steens Mountain Advisory Council
Steens Mountain Ranch, Inc.
Hoyt F. Wilson

C. Interdisciplinary Team

Lindsay Davies - Fisheries/Riparian Specialist, ID Team Leader (*Fisheries, Water Quality, Wetlands/Riparian Zones, SSS – Fauna: Fish)*
Rick Hall - Botanist *(ACECs, Soils)*
Doug Linn - Fire Botanist *(Biological Soil Crusts, SSS – Flora)*
Fred McDonald - Natural Resource Specialist *(Recreation, Visual Resources)*
Gary McFadden - OR/WA Wild Horse and Burro Specialist *(ACECs, Wild Horses and Burros)*
Nick Miller - Fire Wildlife Biologist *(Migratory Birds, Wildlife, SSS – Fauna: Avian)*
Lisa Norfolk - Rangeland Management Specialist *(Grazing Management)*
Skip Renchler - District Lands and Realty Specialist *(Transportation and Roads)*
Lesley Richman - Noxious Weed Specialist *(Noxious Weeds)*
Dan Ridenour - Fuels Planner *(Air Quality)*
Jeff Rose - Fire Ecologist *(Fire Management, Vegetation)*
Don Rotell - Fire Archaeologist *(American Indian Traditional Practices, Cultural Heritage)*

D. Advisory

Bill Andersen, District Range Lead
Jim Buchanan, Supervisory Natural Resource Specialist
Gary Foulkes, District Planning/Environmental Coordinator
Kelly Hazen, GIS Specialist
Brent Meisinger, Prescribed Fire Implementation Specialist
Joan Suther, Resource Area Field Manager
Dave Toney, Prescribed Fire Implementation Specialist

1. ONDA, Page 2. "If management after restoration is not altered, the original problems will return…..Therefore, the EA must address alternatives that specifically involve reductions and/or exclusions of livestock."

   Response: The "original problem" of unchecked juniper expansion began at the turn of the century with the introduction of livestock and the reduced role of fire. Fire is considered to have been the most important factor limiting conifer encroachment prior to European settlement (Miller, 2005). Seasonlong grazing by large numbers of domestic livestock around the turn of the century is believed to have reduced fine fuel loads, thus contributing to a drastically reduced role of fire in the northern Great Basin (Burkhardt and Tisdale, 1976; Miller and Rose, 1999; Miller and Tausch, 2001).

   Historic grazing practices were drastically different than what they are today. Current grazing management is designed to maintain or move toward improved upland and riparian/wetland watershed functions, ecological processes, water quality, and habitats to support native, Threatened and Endangered and locally important species. Chapter II, Section C (Alternatives Considered but Eliminated from Further Analysis) of the EA describes the difference in historic vs. current grazing management on Steens Mountain.

   While grazing management has changed over the past 130 years, the Project Area remains departed from the natural fire regime. Chapter III, Section B (8) describes the current fire regime and condition class of the Project Area. In general, the Project Area has highly to moderately departed from the natural (historical) regime of vegetation characteristics, fuel composition, and fire frequency, severity and pattern.

   The most plausible explanation for this is the history of wildfire suppression activities in the area. Fire control and prevention programs have probably been the most important factor in the decline in fire frequency during the last century (Burkhardt and Tisdale, 1976). Wildfire suppression in the Burns District began in the 1940s. Only recently (in 2005) has wildland fire use for resource benefits been authorized within the Steens Mountain CMPA. Today, wildfires not threatening human life or private property will be evaluated for potential wildland fire use. Any wildland fires in the CMPA that threaten human life, private property or areas possessing important resource or economic value will still be suppressed (Steens CMPA RMP, Page 56). Outside of the CMPA, the Project Area falls under direction from the Three Rivers RMP, which states that full suppression of natural and human-caused fires will occur (Three Rivers RMP, Page 2-106).

   The current condition of the Project Area severely limits the ability to use wildland fire without severe resource reverberations (e.g., excessive soil sterilization, erosion and noxious weed spread). However, the proposed action would move the area toward Condition Class 1 (where the composition and structure of vegetation and fuels are similar to the natural (historical) regime). By moving the Project Area toward Condition Class 1, the ability to utilize wildland fires in the future for resource benefits improves.

Chapter III, Section B (8) of the EA describes the FRCC analysis for the Project Area. The FRCC analysis showed that to restore the Project Area to an appropriate fire regime, vegetation treatments would need to alter both vegetation composition and fuel structure. If this is done, the result would be the restoration of appropriate fire effects within the Project Area.

In order to meet the purpose and need of the project, vegetation treatments need to occur. The EA does consider an alternative that removes grazing from the Project Area (Chapter II, Section C). However, as stated in the EA (Chapter II, Section C), this alternative was eliminated from further analysis based on the following reasons:

- Current grazing management is not considered a causal factor for juniper encroachment and the cessation of such activities would not reduce encroached juniper within the Project Area.
- Adopting this alternative would not meet the purpose and need of the project.
- Following a Grazing Removal Alternative would not be in conformance with the Steens Act – Section 102(b)(2)(4)
- Following a Grazing Removal Alternative would not be in conformance with the Three Rivers RMP/FEIS of 1992 or the Steens Mountain CMPA RMP/ROD of 2005 and FEIS of 2004.
- Following a Grazing Removal Alternative does not consider effects on the total ecosystem of both private and public land.
- Following a Grazing Removal Alternative would disrupt social and economic values.

2. ONDA, Page 1. "The EA contains little discussion or analysis of the impacts of domestic livestock grazing in creating or maintaining the unnatural and undesirable spread of western juniper and invasive weeds and/or suppression of native grass, forb, and shrub species."

Response: Historic livestock grazing practices likely contributed to junipers initial expansion around the turn of the century. Today, current grazing practices administered by the BLM are managed for compliance with the August 12, 1997 Standards for Rangeland Health and Guidelines for Livestock Management (Standards). These standards ensure grazing management that provides for the ecological health of rangelands. In recent times, modern fire control and prevention programs are probably the most important factor influencing juniper expansion (Burkhardt and Tisdale, 1976). Soule', et al. (2004), found that juniper afforestation rates can increase even in the absence of direct human disturbances, such as domestic livestock grazing. See Response #1 and Chapter II, Section C (1) of the EA for further detail.

3. ONDA, Page 2. "The EA arbitrarily fails to consider an alternative limiting juniper treatment in wilderness areas, WSAs, and other areas with documented wilderness values until the BLM has developed appropriate ecological criteria and treatment protocols as envisioned in the WJMA."

   Response: There are no WSAs or Wilderness Areas within the Project Area. In addition, the Steens Act Title V – SEC. 501 Wildland Juniper Management Area (WJMA) does not state any limitations to juniper treatment outside of the WJMA. The Steens Act emphasizes the restoration of the historic fire regime throughout the CMPA. Section 113(c) states, "The Secretary shall emphasize the restoration of the historic fire regime in the Cooperative Management and Protection Area and the resulting native vegetation communities through active management of Western Juniper on a landscape level. Management measures shall include the use of natural and prescribed burning."

   The WJMA was designed for the purposes of "experimentation, education, interpretation and demonstration of active and passive management" (Section 501 (b)). The proposed rangeland restoration project would not be considered experimental since the proposed treatments are similar to numerous juniper control treatments conducted by both the BLM and the EOARC throughout Steens Mountain for approximately 15 years. Chapter IV, Section H (2), states that long-term trends following previous juniper cutting projects on Steens Mountain have shown an increase in perennial forbs, perennial grasses and annual forbs over uncut juniper woodlands during a 13-year period (Bates, et al., 2005).

4. ONDA, Page 3. "The EA fails to adequately present and analyze the effects of the proposed action on the wilderness resource."

   Response: There are no WSAs or Wilderness Areas within the Project Area. In 1980, the BLM conducted an Intensive Wilderness Inventory to determine what public land had potential for wilderness designation. This inventory did not find any portion of the Project Area suitable to be designated as WSAs or to have wilderness characteristics.

   In response to ONDA's submission of proposed WSAs, received September and November 2002, the BLM Burns District formed an ID Team in early 2003 to review the proposals. District personnel with knowledge of one or more of the proposed WSAs were requested to participate in the review process. The ID Team composition varied from proposed WSA to proposed WSA based on a specialists' knowledge of an area and its resources. The ID Team included specialists representing the disciplines of archaeology, rangeland management, rangeland ecology, geology/minerals, wildlife biology, botany, recreation, visual resources, wilderness, and fire ecology.

The ID Team leader prepared review folders for each of the proposed WSAs, including all materials submitted by the citizens group (proposal, map, pictures, and other documentation), a copy of the final intensive BLM inventory documentation, the original BLM inventory photographs, a map showing the original BLM inventory units and subunits in relation to the citizens group proposed WSA, and a map showing existing range improvements. The folders were placed in a central location for each team member to review.

Beginning in February 2003, the ID Team met several times prior to formally reviewing the proposals. During these meetings, the ID Team developed meeting guidelines, a proposal review protocol, and a Citizen Proposal Evaluation Form. Oregon BLM State Office wilderness personnel reviewed and commented on the proposal review protocol and the Citizen Proposal Evaluation Form. The ID Team also agreed on common definitions for "significantly different," "way," and "road" to be used during proposal review.

The proposal review protocol contains the following decision points to be used in determining if the proposed WSA has wilderness characteristics:

1) Whether or not a vehicle route in the proposed WSA is a road. If a vehicle route is determined to be a road and splits the proposed WSA into subunits, each subunit would be evaluated separately.

2) If the unit and any subunits meet the minimum size requirement of 5,000 acres. Any unit or subunit less than the minimum acreage was not considered further, unless it was contiguous to an existing WSA.

3) What physical change(s), if any, have occurred in the proposed WSA since the final intensive BLM inventory?

4) Whether or not each proposed WSA or subunit meets the wilderness definition of naturalness.

5) Whether or not each proposed WSA or subunit contains outstanding opportunities for primitive and unconfined recreation or solitude?

In addition to internally compiling information on existing range improvements, roads, and other resource management activities, this information was also requested, and received, from livestock grazing permittees with grazing operations in the proposed WSAs.

The ID Team met in April 2003 to review each proposal. As each area was reviewed using the proposal review protocol, team members' comments and recommendations were recorded. Information compiled for each area was transferred to the Citizen Proposal Evaluation Form and BLM road numbers were added to the text to clarify road locations. When Citizen Proposal Evaluation Forms were completed, specialists reviewed the forms and submitted comments or corrections, prior to form finalization and signing by each participating specialist.

While the Andrews and Three Rivers Resource Area Field Managers were informed of the process by which the proposals would be evaluated, Field Managers were not part of the ID Team and did not participate in ID Team meetings. The Oregon BLM State Office provided guidance during the review process as evidenced by the June 16, 2003 Memorandum from the Deputy State Director for Resource Planning, Use and Protection titled "Interim Wilderness Inventory and Study Procedures."

Of the 23 ONDA proposed WSAs, the Riddle Creek Proposed WSA (Figure 1), was the only parcel that falls within the Project Area. As a result of the 2003 review process, the ID Team found ONDA's information for the Riddle Creek Proposed WSA was not significantly different from information presented in the final intensive BLM wilderness inventory documents. New information based on team members' extensive field knowledge of resources and conditions of the parcel was also considered. The findings of the ID Team were that several subunits separated by roads in the Riddle Creek Proposed WSA did not meet the 5,000-acre requirement and were not evaluated further.

Two subunits, not separated by a road were combined and met the 5,000-acre requirement. The findings of the ID Team were that the two subunits do not contain wilderness characteristics.

In 2006, a BLM ID Team reviewed the Project Area and identified two additional parcels in the Paul Creek and Smyth Creek areas that met the 5,000-acre size criteria (Figure 1).

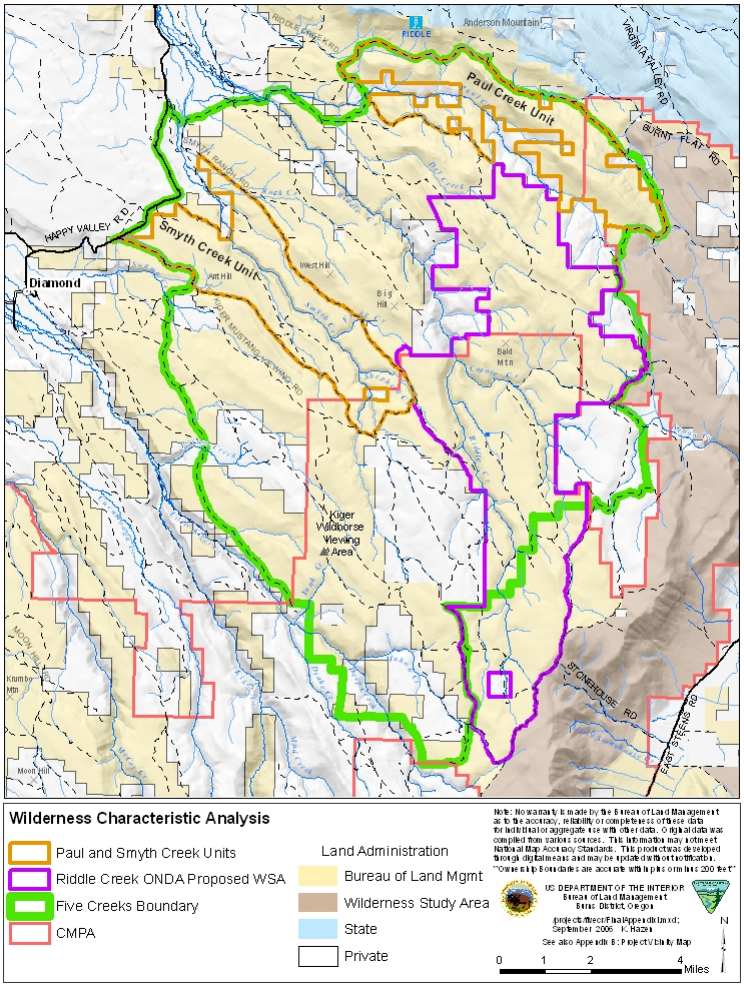

Figure 1. Units analyzed for wilderness characteristics

The ID Team found that current information for both areas was not significantly different from information presented in the final intensive BLM wilderness inventory documents. The findings of the ID Team were that the Paul Creek and Smyth Creek parcels do not contain wilderness characteristics. Both the Three Rivers Resource Area Field Manager and the Burns District Manager concurred with the ID Team findings for all three parcels. Documentation of these findings is available at the Burns District Office. Therefore, there are no parcels containing wilderness characteristics within the Project Area and such parcels were not considered further in the EA.

5. ONDA, Page 3. "The maps in the EA do not show the WJMA boundary, but the project area appears to contain areas outside the WJMA. It is not clear how the project would be consistent with the Act because of the treatment outside of the WJMA."

Response: See Response #3.

6. ONDA, Page 4: "It is important to note that reintroduction of livestock following treatment has not received adequate scrutiny and the typically-adopted two years rest following treatment has never been tested experimentally… the BLM must discuss this issue in much greater detail."

   Response: PDE #9 in Chapter II, Section B of the EA states that livestock grazing would not occur for *at least* two growing seasons (May 1 to June 30) in pastures treated with prescribed broadcast fire. Timing for reintroduction of grazing would be determined by rangeland monitoring of the response of native plant communities. Success of perennial grass species within the Project Area would be determined by frequency of occurrence of key native species and species of the seed mix and measurement of a density of three perennial grass species per m^2 (see EA, Appendix H - Table A).

7. ONDA, Page 5. "Decision must clarify whether and where reseeding will occur. ONDA is hopeful that there will be no seeding of crested wheatgrass."

   Response: The BLM plans on providing for and monitoring natural revegetation for the majority of treated areas. Areas in late transition to juniper woodlands that lack a shrub and herbaceous understory and/or those localized areas that burn with high severity where some soil sterilization might occur would be sites identified for reseeding. Those portions of the burned areas would be reseeded to avoid introduction/establishment of noxious weeds and to accelerate natural revegetation. The BLM does not plan to reseed any areas with crested wheatgrass. See Chapter II, Section B, PDE 11 and Chapter III, Section B (2) of the EA for further detail.

8. ONDA, Page 5. "The EA dismisses the allegedly short-term negative impacts that will occur to sage-grouse, simply noting that the habitat would 'eventually come back.' The EA must also analyze how this will affect the sage-grouse population in the long run."

   Response: The EA has been amended to include greater detail on the long-term effects to sage-grouse. See Chapter IV, Section C (4).

9. ONDA, Page 6. Inadequate consideration was given to ensure the following (paraphrase):

   a. Vegetative manipulation benefits the long-term health of sage-grouse habitat.
   b. Treatments avoid areas highly susceptible to exotic species invasion.
   c. Restoration employs reseeding to native vegetation or allowing natural native regeneration in the absence of grazing disturbance.
   d. Avoidance of prescribed fire in Wyoming big sagebrush and lower-elevation basin big sagebrush unless such treatments are highly likely to improve sage-grouse habitat.

Response:

a. The actions proposed would likely restore sage-grouse habitat in mountain big sagebrush and low sagebrush sites that are currently considered unsuitable for sage-grouse due to juniper encroachment (EA Chapter IV, Section C (4)).

b. There are two PDEs in the EA that address noxious weed invasion (Chapter II (B)). In addition to these PDEs, there is a specific treatment for Wyoming big sagebrush and basin big sagebrush-bunchgrass community types. These communities are found primarily at lower elevations (below 5,000 feet) in the Project Area, and consequently, are more vulnerable to cheatgrass and noxious weed invasion. Treatments in these communities are designed to limit ground disturbance and noxious weed/cheatgrass establishment (Chapter II (B).

c. See Response #7.

d. In Chapter II, Section B of the EA, there is a specific treatment designed for Wyoming big sagebrush and basin big sagebrush-bunchgrass communities. As stated in the EA, the primary treatment in these communities would be cutting and jackpot burning, during the late fall, winter, and early spring. A limited amount of cutting and leaving the downed juniper in place may also occur. These treatments were proposed to minimize impacts to the sagebrush component of these communities with the objective of an intact Wyoming and basin big sagebrush overstory.

10. ONDA, Page 6. "BLM must provide for more concrete compliance with water quality standards until such time as TMDLs are prepared for the planning area…the BLM's description of the affected environment vis-á-vis water quality fails to identify the main causes of watershed degradation, particularly grazing practices…the risk of significant levels of sedimentation and increases in water temperatures threatens violations of the Clean Water Act…"

Response: Although Section 313 (Federal Facilities Pollution Control) of the Clean Water Act (CWA) appears to be more associated with point source pollution from facilities/properties, this section is stated in terms of "subject to, and comply with, all Federal, State, interstate, and local requirements, administrative authority, and process and sanctions respecting the control and abatement of water pollution …." Potential water pollution associated with the Five Creeks Rangeland Restoration Project is recognized as nonpoint source pollution. As stated in Copeland (1997), "because there are no federal controls over these sources under the Clean Water Act, the primary implementation measures will be state-run nonpoint source management programs coupled with state, local, and federal land management programs and authorities."

The ODEQ administers the State water quality program and develops Total Maximum Daily Load (TMDL) and associated implementation plans, Water Quality Management Plans (WQMP). The TMDL and WQMP implements water quality standards and thus provides a regulatory framework and defines the components for measuring compliance with the CWA. The TMDL and WQMP for the areas encompassing the Project Area are scheduled for completion by DEQ in 2010. The DEQ's review of similar BLM proposed actions for watershed restoration recognized this type of action as "an opportunity for the BLM to be proactive on water quality related issues" and that "the absence of a TMDL should not deter your agency from that mission" (DEQ 2006).

11. ONDA, Page 6. "Effects to soils and biological crusts were not adequately analyzed. This project has the potential for significant disturbances to soils and crust, before, during and after the variety of treatments proposed."

    Response: The soils and biological crusts were adequately analyzed in the EA. Please see Chapter IV, Sections B(1)(10), D(1)(10), F(1)(10), H (1)(10) of the EA for further detail.

12. ONDA, Page 6. ONDA quotes from the EA that, "the use of large track or wheeled machines to either grind or cut and pile brush and trees would not result in long-term localized compaction to the soil and [biological soil crusts]." – No scientific citation is given, making this conclusion questionable.

    Response: The quoted section has been clarified. Changes to the text have been made as a result of this comment and other public comments. See Chapter IV, Section H (10).

13. ONDA, Page 7. ONDA states that, "The effects and cumulative effects sections on soils are inadequate and unsupported in their optimistic assessment that the effects from the treatments would be insignificant and the treatments proposed would reduce erosion…They do not even discuss impacts from grazing."

    Response: The effects of juniper treatments (proposed action) on the soil resource are analyzed in Chapter IV, Section D(1) and H(1). In Chapter IV, Section D (1), the EA states that similar juniper treatments conducted on the Steens Mountain have indicated increased soil stability following the prescribed burns as measured by SSFs (BLM rangeland monitoring 1997, 1999). These results do support the assessment that the proposed action would reduce erosion in the Project Area.

    The cumulative effects of the proposed action on soils has been modified to discuss livestock grazing impacts [Chapter IV, Section H(1)].

    Overall, the PDEs of the proposed action would enhance and protect the integrity of watershed function, improve watershed stability, and decrease accelerating erosion by reestablishing diverse plant communities. It would also increase vegetation cover and litter, and reduce the amount of exposed soil.

14. SSC, Page 1. The BLM statement that "current grazing practices are not considered a causal factor for modern juniper establishment and the cessation of such activities would not reduce juniper encroachment" is misleading. Continued livestock grazing will continue to remove and suppress regrowth of grasses, forbs, and sagebrush that (a) may crowd and compete with juniper seedlings for water and soil resources, and (b) carry periodic fire that kills juniper seedlings. Cessation of livestock grazing would help recover a landscape that has been utterly transformed by decades of "disturbance" and "fire exclusion."

    Response: Current grazing practices administered by the BLM are managed for compliance with the August 12, 1997 Standards for Rangeland Health and Guidelines for Livestock Management (Standards). These standards ensure grazing management that provides for sustainable ecological health of rangelands. Proper management does not continually remove and suppress grasses, forbs, and sagebrush. Even so, juniper is highly competitive and does not seem to be suppressed by competition from other vegetation. Burkhardt and Tisdale state in their 1976 publication that "there is no reason to believe that competition from other vegetation will crowd out juniper already established or prevent the establishment of new juniper plants."

    Historic grazing practices did eliminate fine fuels needed for the spread of natural fire through an ecosystem. Today, however, grazing management is managed to meet the Standards for Rangeland Health and the Guidelines for Livestock Grazing Management for Oregon and Washington, which provide for and assess the ecological condition of the land. Fire suppression activities are the overriding factor controlling fires in the Project Area. See Response #1 for further details.

15. SSC, Page 2. The SSC questions the implications suggested by the literature and drawn by the BLM in the EA regarding livestock's current role in juniper expansion (paraphrase). Therefore, "the EA fails to present sufficient justification for the BLM's conclusion that eliminating grazing from the Project Area would not meet the purpose and need for [the proposed] action."

    Response: The BLM re-examined the cited research. The research supports the information provided within the EA. See Responses #1, #2 and #14 for further details.

16. SSC, Page 3. "We recommend that the BLM develop a programmatic management plan and environmental impact statement to help guide the development of these plans, identify best management practices, and avoid duplication of effort."

    Response: Outside scope of this document. This is generally covered in RMPs (as seen in Steens/Andrews RMP/EIS – Pages 2-19 through 2-22, 3-13, and Pages 4-40 through 4-52.) on a land allocation and programmatic basis. Subsequently, site-specific planning documents, tiered to the RMP, are prepared to analyze proposed management actions.

17. ODFW, Page 1. ODFW proposes to "Add a Project Design Element (PDE) that will protect sagebrush habitat near sage-grouse leks."

Response: PDE #15 was incorporated in response to this comment.

18. ODFW, Page 2. ODFW recommends that "broadcast burning not be used in the areas which are in the early stages of juniper encroachment or in sites that are unaffected by juniper invasion… juniper could either be cut or individually burned."

Response: Broadcast burning would not be used in larger tracts of big sagebrush communities that are being unaffected by juniper invasion. However, there may be some areas of this type of habitat intermixed within larger tracts of big sagebrush habitat in a mid to late seral stage of juniper transition that would receive broadcast burning treatments.

In areas of big sagebrush in an early transitional state toward juniper woodlands, the objective is to burn approximately 40 to 60 percent of the habitat in a mosaic pattern. A mosaic pattern would leave intermixed islands and fingers of unburned and burned areas. Such burns would still provide habitat for many of the sagebrush obligate species as well as accelerate re-establishment of big sagebrush communities into the burned areas.

In addition, PDEs #13 and #14 would help reduce the effect of treatments on big sagebrush areas unaffected by juniper encroachment and big sagebrush areas in an early transitional stage of juniper encroachment.

13. Larger tracts of early transition mountain big sagebrush communities, identified by the staff wildlife biologist or resource advisor during layout, would either be left untreated, or treated by cut and jackpot burned or single-tree burning to retain mountain big sagebrush habitat.

14. Invasive juniper would be treated aggressively within Greater sage-grouse 2-mile lek buffers. Treatment methods would be limited to cutting and individually burning juniper within the buffer area. Treatments within the 2-mile buffer area would not take place from March 1 to June 15.

With these PDEs in place the BLM should be able to protect big sagebrush habitat that is not affected by juniper or is in an early transitional state of juniper encroachment. The BLM will coordinate with ODFW during project layout if there are specific areas that ODFW recommends protection from a broadcast fire.

19. ODFW, Page 2. ODFW recommends that PDE #13 on Page 25 of the EA be changed to read "Retain all old growth juniper stands. Retain 10.0 to 15.0 percent of expansion juniper to provide hiding and thermal cover for mule deer and elk and to provide for future old growth."

Response: Refer to PDE #12 for changes made in response to this comment.

20. ODFW, Page 2. ODFW recommends that, "jackpot burns be kept an adequate distance away from old growth and other juniper trees designated for retention to avoid killing or severely damaging them during the burn."

Response: In reference to juniper with old growth characteristics and/or obvious wildlife occupation, PDE #12 was added to and now states, "Protection of such trees during all prescribed fire operations would be considered where feasible under the constraints of human safety."

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Glossary

Appropriate action-implementing actions pursuant to subparts 4110, 4120, 4130 and 4160 of the regulations that will result in significant progress toward fulfillment of the standards and significant progress toward conformance with the guidelines (see Significant progress).

Assessment-a form of evaluation based on the standards of rangeland health, conducted by an interdisciplinary team at the appropriate landscape scale (pasture, allotment, sub-watershed, watershed, etc.) to determine conditions relative to standards.

Compaction layer-a layer within the soil profile in which the soil particles have been rearranged to decrease void space, thereby increasing soil bulk density and often reducing permeability.

Crust, Abiotic-(physical crust) a surface layer on soils, ranging in thickness from a few millimeters to a few centimeters, that is much more compact, hard and brittle, when dry, than the material immediately beneath it.

Crust, Biotic-(microbiotic or cryptogamic crust) a layer of living organisms (mosses, lichens, liverworts, algae, fungi, bacteria, and/or cyanobacteria) occurring on, or near the soil surface.

Degree of function-a level of physical function relative to properly functioning condition commonly expressed as: properly functioning, functioning-at-risk, or non-functional.

Diversity-the aggregate of species assemblages (communities), individual species, and the genetic variation within species and the processes by which these components interact within and among themselves. The elements of diversity are: 1. community diversity (habitat, ecosystem), 2. species diversity; and 3. genetic diversity within a species; all three of which change over time.

Energy flow-the processes in which solar energy is converted to chemical energy through photosynthesis and passed through the food chain until it is eventually dispersed through respiration and decomposition.

Groundwater-water in the ground that is in the zone of saturation; water in the ground that exists at, or below the water table.

Guideline-practices, methods, techniques and considerations used to ensure that progress is made in a way and at a rate that achieves the standard(s).

Gully-a channel resulting from erosion and caused by the concentrated but intermittent flow of water usually during and immediately following heavy rains.

Hydrologic cycle-the process in which water enters the atmosphere through evaporation, transpiration, or sublimation from the oceans, other surface water bodies, or from the land and vegetation, and through condensation and precipitation returns to the earth's surface. The precipitation then occurring as overland flow, streamflow, or percolating underground flow to the oceans or other surface water bodies or to other sites of evapo-transpiration and recirculation to the atmosphere.

Indicators-parameters of ecosystem function that are observed, assessed, measured, or monitored to directly or indirectly determine attainment of a standard(s).

Infiltration-the downward entry of water into the soil.

Infiltration rate-the rate at which water enters the soil.

Nutrient cycling-the movement of essential elements and inorganic compounds between the reservoir pool (soil, for example) and the cycling pool (organisms) in the rapid exchange (i.e., moving back and forth) between organisms and their immediate environment.

Organic matter-plant and animal residues accumulated or deposited at the soil surface; the organic fraction of the soil that includes plant and animal residues at various stages of decomposition; cells and tissues of soil organisms, and the substances synthesized by the soil population.

Permeability-the ease with which gases, liquids or plant roots penetrate or pass through a bulk mass of soil or a layer of soil.

Properly functioning condition-Riparian-wetland: adequate vegetation, landform, or large (coarse) woody debris is present to dissipate stream energy associated with high water flows, thereby reducing erosion and improving water quality; filter sediment, capture bedload, and aid in flood plain development; improve flood-water retention and ground water recharge; develop root masses that stabilize streambanks against cutting action; develop diverse channel and ponding characteristics to provide the habitat and water depth, duration and temperature necessary for fish production, waterfowl breeding, and other uses; and support greater biodiversity. The result of interaction among geology, soil, water, and vegetation.

Uplands: soil and plant conditions support the physical processes of infiltration and moisture storage and promote soil stability (as appropriate to site potential); includes the production of plant cover and the accumulation of plant residue that protect the soil surface from raindrop impact, moderate soil temperature in minimizing frozen soil conditions (frequency, depth, and duration), and the loss of soil moisture to evaporation; root growth and development in the support of permeability and soil aeration. The result of interaction among geology, climate, landform, soil, and organisms.

Proper grazing use-grazing that, through the control of timing, frequency, intensity and duration of use, meets the physiological needs of the desirable vegetation, provides for the establishment of desirable plants and is in accord with the physical function and stability of soil and landform (properly functioning condition).

Reference area-sites that, because of their condition and degree of function, represent the ecological potential or capability of similar sites in an area or region (ecological province); serve as a benchmark in determining the ecological potential of sites with similar soil, climatic, and landscape characteristics.

Rill-a small, intermittent water course with steep sides; usually only a few inches deep.

Riparian area-a form of wetland transition between permanently saturated wetlands and upland areas. These areas exhibit vegetation or physical characteristics reflective of permanent surface or subsurface water influence. Lands along, adjacent to, or contiguous with perennially and intermittently flowing rivers and stream, glacial potholes, and shores of lakes and reservoirs with stable water levels area typical riparian areas. Excluded are such sites as ephemeral streams or washes that do not exhibit the presence of vegetation dependent upon free water in the soil. Includes, but is not limited to, jurisdictional wetlands.

Significant progress-when used in reference to achieving a standard: (actions), the necessary land treatments, practices and/or changes to management have been applied or are in effect; (rate), a rate of progress that is consistent with the anticipated recovery rate described in plan objectives, with due recognition of the effects of climatic extremes (drought, flooding, etc.), fire, and other unforeseen naturally occurring events or disturbances. Monitoring reference areas that are ungrazed and properly grazed may provide evidence of appropriate recovery rates (see Proper Grazing Use).

Soil density-(bulk density)-the mass of dry soil per unit bulk volume.

Soil moisture-water contained in the soil; commonly used to describe water in the soil above the water table.

Special status species-species proposed for listing, officially listed (T/E), or candidates for listing as threatened or endangered by the Secretary of the Interior under the provisions of the Endangered Species Act; those listed or proposed for listing by the State in a category implying potential endangerment or extinction; those designated by each Bureau of Land Management State Director as sensitive.

Species of local importance-species of significant importance to Native American populations (e.g., medicinal and food plants).

Standard-an expression of the physical and biological condition or degree of function necessary to sustain healthy rangeland ecosystems.

Uplands-lands that exist above the riparian/wetland area, or active flood plains of rivers and streams; those lands not influenced by the water table or by free or unbound water; commonly represented by toe slopes, alluvial fans, and side slopes, shoulders and ridges of mountains and hills.

Watershed-an area of land that contributes to the surface flow of water past a given point. The watershed dimensions are determined by the point past, or through which, runoff flows.

Watershed function-the principal functions of a watershed include the capture of moisture contributed by precipitation; the storage of moisture within the soil profile, and the release of moisture through subsurface flow, deep percolation to groundwater, evaporation from the soil, and transpiration by live vegetation.

Wetland-areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and which under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.